PATIENT SAFETY ACROSS THE CONTINUUM OF CARE

by

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ABSTRACT

The problem of information transfer between healthcare sectors and across the continuum of care was examined using a mixed methods approach. These methods include qualitative interviews, retrospective case reviews and an informatic gap analysis. Findings and conclusions are reported for each study.

Qualitative interviews were conducted with 16 healthcare representatives from 4 disciplines (medicine, pharmacy, nursing, and social work) and 3 healthcare sectors (hospital, skilled nursing care and community care). Three key themes from a Joint Cognitive Systems theoretical model were used to examine qualitative findings. Agreement on cross-sector care goals is neither defined nor made explicit and in some instances working at cross purposes. Care goals and information paradigms change as patients move from hospital-based crisis stabilization, diagnosis and treatment to a postdischarge care to home or skilled nursing recovery, function restoration, or end of life support. Control of the transfer process is variable across institutions with little feedback and feed-forward. Lack of knowledge, competency and information tracking threatens sector interdependencies with suspicion and distrust.

Sixty-three patients discharged between 2006 and 2008 from hospitals to skilled nursing facilities were randomly selected and reviewed. Most notably missing are discharge summaries (30%), nursing assessments or notes (17%), and social work documents (25%). Advanced directives or living wills necessary for end of life support were present in only 6% of the cases. The presence of information on activities of daily living (ADLs), other disabling conditions, and nutrition was associated with positive outcomes at the 0.001, 0.04 and 0.08levels. Consistent geriatric information transfer across the continuum is needed for relevant care management.

An interoperability gap analysis conducted on the LINC (Linking Information Necessary for Care) transfer form determined its interoperability to be the semantic level 0. Detailed Clinical Models representing care management processes are challenged by the lack of consensus in terminology standards across sectors. Construction of information transfer solutions compliant with the Centers of Medicare and Medicaid Services (CMS) Stage 2 meaningful use criteria must address syntactic and semantic standards, map sector terminologies within care management processes, and account for the lack of standard terminologies in allied health domains.

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ACKNOWLEDGEMENTS

I first wish to dedicate this work to my parents who passed in 2008 within 4 days of one another. They were never able to see the completion of this effort but taught me that despite what life brings, perseverance is the key to success. Without passing their work ethic down to me, this dissertation would never have been completed. I especially dedicate this work to my mother, as I remember her writing her master's thesis on a Royal typewriter without corrective erase. Secondly, I want to thank Robert and Claire for their ongoing support and love. And thirdly, I want to thank the medical records staff who kept me entertained while I worked on a wobbly card table abstracting data from nursing home charts.

And finally, I am grateful to my committee members for staying with me despite my personal delays. All of you have contributed to this final product in differing and complementary ways as I work across disciplines to truly understand a real and challenging problem. I appreciate the critical reviews; the insistence that this be done correctly; the willingness to entertain both a social work and medical informatics research agenda; the ongoing support and willingness to meet; and the patience to allow me to grow through the experience. I am particularly grateful to Dr. Charlene Weir who has been my chair, a friend, a mentor, and a task master. I hope you are happy that this is finally done. I am! Thank you all.

CHAPTER 1

INTRODUCTION

The aging of America is generating new economic and patient safety challenges to the delivery of healthcare (1). Changing patterns of healthcare utilization raise interesting research questions about continuity of care; transfers in care; and risk amelioration across the continuum of care. The trend in healthcare utilization patterns for aging adults (65 and older) is more frequent hospitalizations for shorter periods of time (1). As a result, aging adults are being discharged back into a variety of community care placements including: 1) their own homes; 2) other institutional care (nursing homes, rehabilitation centers, assisted living facilities); or 3) in-home healthcare and community care services (2). Increasing responsibility is being placed on the receiving entity, and as a result, the transfer of relevant medical care information becomes imperative.

Rapid, accurate, and relevant information exchange is vital for those with increasing age, co-morbidities, multiple medications, and multiple interfacility transfers. Poor information exchange, can in turn, contribute to poor discharge outcomes and adverse events. The thesis of this dissertation proposes that improved information transfer will improve the quality of care across the continuum, resulting in a) decreased hospital readmissions, b) extended lengths of stay, c) emergency room visits, or d) patient injury. The goal of this dissertation

is to evaluate the pattern of information transfer between healthcare sectors and to assess the association between information transfer and patient outcomes. The changing landscape of healthcare delivery significantly increases the complexity of the information transfer problem and this dissertation looks to biomedical informatics for solutions.

Chapter 1 provides an overall introduction to the research theory of Joint Cognitive Systems (JCS). JCS lays the groundwork for the research perspective. A Health Information Technology (HIT) Evaluation model is presented as an evaluation framework to coordinate the research aims. Chapter 1 ends with an overview of the dissertation's research aims. Chapter 2 presents the background literature for contextual understanding of the problem. The background literature includes a description of aging demographics; a discussion about the continuum of care context; an analysis of the problem with transitions in care; and presents information technology as a solution**.** This research addresses the following questions:

1) What are clinicians' experiences, factors and issues associated with information transfer across the care continuum?

2) What are the patterns of information transferred from hospital care to nursing home care at the a) document level; b) care management level; c) clinical concept level; and d) patient outcomes level?

3) What are the interoperability issues and challenges across institutions at the a) document level, b) care management level; c) clinical concept level and d) with the LINC transfer form?

Chapters 3, 4 and 5 present three research studies and their corresponding aims, methodologies, findings, and limitations. Study 1(reported in Chapter 3) explores the experiences with information transfer from the perspectives of four disciplines and across three healthcare sectors within the framework of Joint Cognitive Systems. Study 2 is divided into four parts and is described in Chapter 4.Information transfer is described at the document level, at the care management level, at the clinical concept level and at the patient outcome level. Chapter 5 builds on findings from study 3 by analyzing issues of semantic interoperability. Three informatics examples (documents, care management processes and clinical concepts) are presented. Chapter 6 discusses overall conclusions, contributions and future directions. Finally, the Appendices include a glossary of terms (Appendix A), the qualitative interview instrument (Appendix B), the LINC transfer form (Appendix C) and a local example (Appendix D) of an application of the LINC data elements.

Joint Cognitive Systems Theoretical Framework

Joint Cognitive Systems (JCS) are the collaborative undertakings of humans in complex environments and a component of Cognitive Systems Engineering and its focus is on “how humans can cope with and master the complexity of processes and technological environments” (3) (p. 1).JCS employs a “systems” view that emphasizes the interdependence of human cognition and the environmental context in which work occurs. Rather than viewing work as the separate interaction of disparate individuals exchanging information or a sterile act of information exchange through document transfer, work can be seen as a “joint cognitive system.” When the

JCS is modeled and understood, joint functions can be facilitated and improved to achieve a desired outcome**.**

Successful performance of the JCS is based on appropriate control, mastery of variation and maintenance of orderliness. The components of a JCS include: *goal orientation*, *enhancement of control* and *co-agency* between participating parties. *Goal orientation* refers to the degree to which the goals of the different components of the system are aligned and for this research the goals of the system are patient safety and continuity of care across sectors. Cross-sector goal alignment is challenging given the varying contexts of each sector. For example, inpatient hospital goals encompass medical crisis stabilization, diagnostic investigation, disease interventions and the initiation of therapy. Long-term community care goals focus on medical recovery, function restoration, end of life support, care coordination and clinical care management processes. Aligning goals of care across the differing contexts requires understanding of the commonalities and differences between the sectors and examining the clinical continuity interfaces between them.

The second component of the JCS model is *control*. Being in control of a process is defined as knowing what has happened (the past) and having the information to anticipate what will happen (the future). Enhancing control requires sufficient knowledge and time, limited task loads, clear alternatives or procedures, sufficient resources and the ability to evaluate and plan. Sufficient knowledge includes understanding the deeper context as well as current dynamics. The lack of readiness or preparedness for unexpected events could result in delays, lack of resources and unavailable information. Additionally, once

something has been identified, the question arises as to whether there is the capacity and resources available to manage it.

Sufficient time includes the ability to predict what is likely to happen as well as having time to handle unexpected events. Each determinant is used to frame findings from the qualitative interviews. Lack of performance with any of these determinants moves a process towards a state of “loss of control." Managing these conditions enables the actor to maintain control and to minimize entropy, that is “maintaining a dynamic equilibrium…in an unpredictable environment.”(3)(p. 46). Loss of control in any system regardless of environment creates likely conditions for error.

Co-agency is the third component in understanding the JCS model. Actions from all participants and the environment are part of a larger stream of interdependencies and interrelatedness. Co-agency includes both the human-to-human interactions as well as the human-to-technology interactions. The human-to-human interaction is represented by the transfer of information between health professionals and the human-to-technology interactions are relevant to the development of an informatic solution. Understanding the interdependencies and interrelatedness is paramount to this dissertation thesis.

Health Information Technology Evaluation

Evaluation research includes the perspectives of stakeholders and is to be done in a manner that is useful. To be useful, this evaluation focuses on developing a system determined by users’ needs(4).The Health Information Technology (HIT) model (5) provides a framework for coordinating the research

aims of this dissertation. The HIT evaluation steps include: 1) understanding the problem; 2) understanding the causes, factors and issues; 3) understanding measurements and data requirements; 4) implementing a proposed solution, and measuring and evaluating the outcome. Findings from each of the research studies will fulfill the goals of the first three steps of the HIT model.

Each study builds on the lessons learned from the previous study. Research questions #1 and #2 explore health professionals' experiences with information transfer in order to understand the problem from a user's perspective. Research questions #3 and #4 look more closely at the causes, factors and issues associated with information transfer. Research questions #5 and #6 analyze the problem at the information element level to determine the basis for solution development. Recommendations for a proposed solution are discussed in the final chapter in anticipation of postdoctoral research.

Research Aims

Study 1: Clinician experiences with information transfer across the care continuum

Aim #1.1.

#1.1.1: Characterize the experiences of information transfer across the continuum of care among and between interdisciplinary healthcare professionals using a Joint Cognitive Systems model.

Study 2: Patterns of information transfer across the inpatient and nursing home care continuum

Aim #2.1. Information transfer at the document level

#2.1.1: Describe the pattern of information transfer at the document level.

#2.1.2: Assess the quality of information transfer at the document level between patients with and without ICD 9 coded mental disease diagnoses

Aim #2.2. Information transfer at the care management level

#2.2.1: Describe the pattern of information transfer at the care management level.

#2.2.2: Assess the quality of information transfer at the care management level between patients with and without ICD 9 coded mental disease diagnoses.

Aim #2.3. Information transfer at the clinical concept level

#2.3.1: Describe the pattern of information transfer at the clinical concept level.

#2.3.2: Assess the quality of information transfer at the clinical concept level between patients with and without ICD9 coded mental disease diagnoses.

Aim #2.4. Impact of information transfer on patient outcomes

#2.4.1: Assess the relationship between information transfer and positive and negative patient outcomes at the level of:
a) ICD9 coded mental disease diagnosis;
b) Documents;
c) Care management.

Study 3: Semantic interoperability issues between institutions across the continuum of care

Aim #3.1.

#3.1.1: Describe the challenges to interoperability across the continuum of care using individual case examples of information transfer at the level of:

a) Administrative information;
b) Care management;
c) Clinical concepts.

#3.1.2: Conduct a gap analysis of the LINC form as a solution to information transfer at the semantic interoperability levels 0, 1, 2, and 3.

#3.1.3: Examine the LINC form as a foundation for Detailed Clinical Model.

CHAPTER 2

BACKGROUND

The Growing Senior Population

Background information is presented in Chapter two in order to contextualize the study problem. The chapter discusses aging demographics; the continuum of care; the problem of transitions in care; and information technology as a solution.

The number of older adults in the United States (U.S.) is growing (see Figure 1). In 2000, there were approximately 35 million people who were 65 or older representing about 13% of the U.S. population. The aging sector is expected to double to 70 million in the next 25 years comprising 20% of the total U.S. population(1). The predominant proportion of this population is female and as age increases, this proportion gets larger.

The older the population gets, the higher the risk of certain diseases and disorders. Chronic health conditions vary by gender, with women aged 70 or older experiencing higher rates of arthritis and hypertension and men aged 70 and older showing higher rates of diabetes, cancer, stroke, and heart disease (see Figure 2).

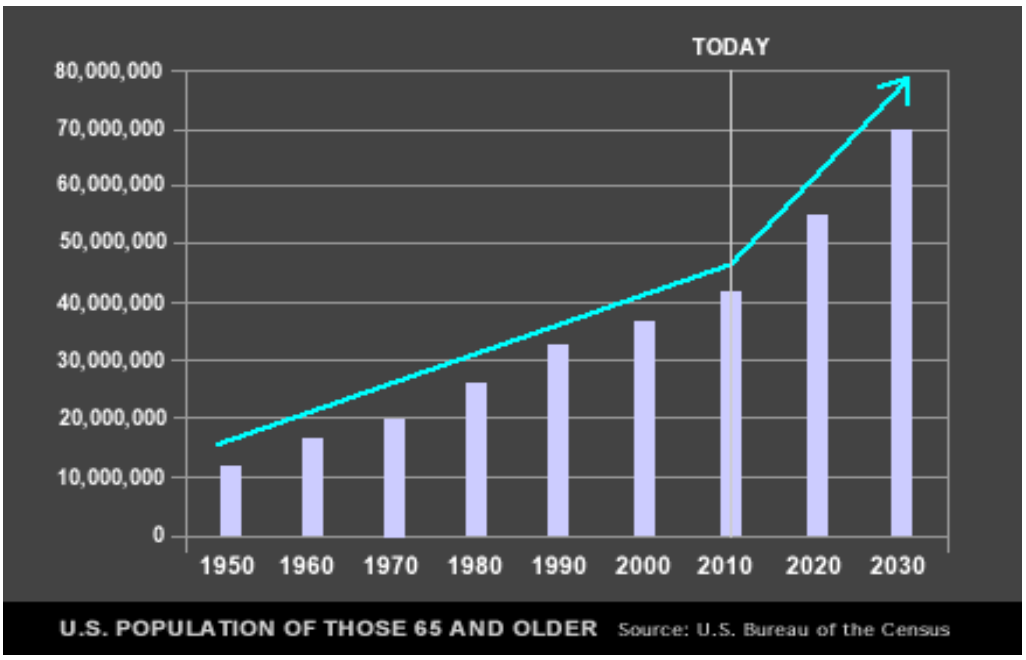


Figure 1. Increase in Aging Adults in the United States (6)

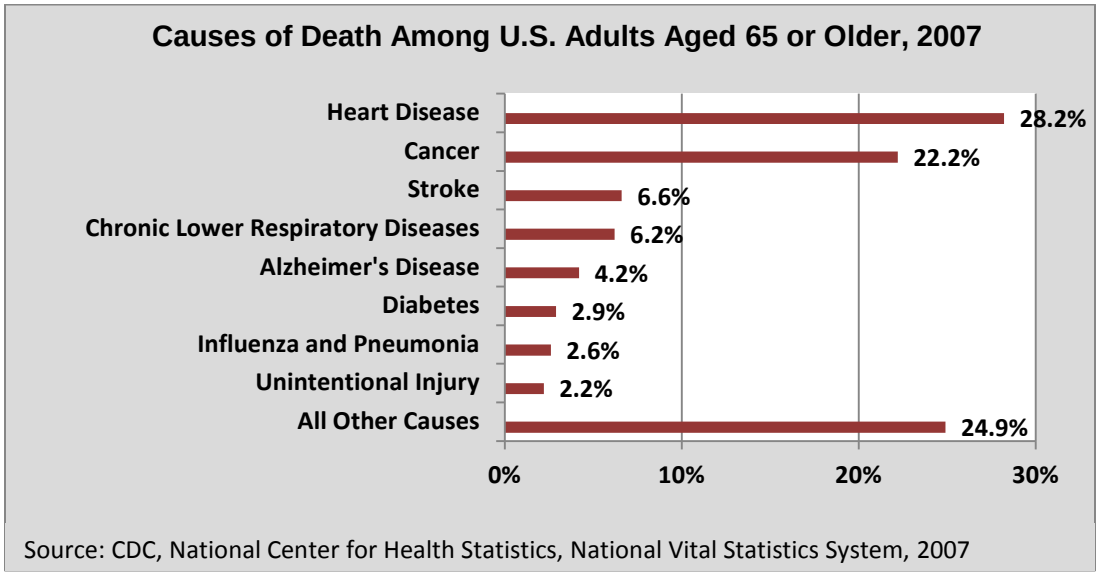


Figure 2. Causes of Death Among Aging Adults (7)

Senior care is complicated by multiple health risk factors, thus compounding the need for accurate information. Senior care additionally spans both the healthcare *and* human services sectors. As care becomes decentralized, patient safety is increasingly at risk. The accurate transfer of information on behalf of complex patients across the continuum of care is a necessary condition for safety and continuity of care.

The "Continuum of Care"

The United States (U.S.) healthcare industry is comprised of several sectors which deliver care to patients. These sectors include ambulatory care, hospital care, and long-term care (posthospital care). *Ambulatory care* is comprised of doctor's office visits, outpatient imaging and laboratory services, pre-hospitalization urgent care, and same day surgeries. *Hospital care* includes emergency room services, intensive care, medical-surgical services, oncology care, labor and delivery services, and other specialized services needing hospital-based round the clock monitoring and service delivery. *Post-hospital* care is defined as "health, personal care, and social services given over a sustained period to persons who have lost some capacity for self-care because of a chronic illness or condition" (8).

The posthospital care sector provides a broad array of health and social services including skilled nursing care, assisted living facilities, community residential care, home healthcare, assistive technologies, adult day care, respite care, personal care, as well as other supportive health and human resources. *Social care* of the elderly (known as elder care) is the provision of services such

as assisted living, adult day care, respite care and personal home care services intended to support a senior's desire to "age in place." Social care of the elderly has traditionally fallen to family members and varies by culture and country but falls mostly onto the shoulders of women (9). The integration of medical with social care is not without its advocates and economic pressures (10, 11). Recent policy statements are calling for interoperability across the delivery of health *and* human services.

Social care in the U.S., is paid for by the individual, family, or if income eligible, by county governmental sources. As medical expenditures have increased and the political will to cut costs has intensified, social care as a cost effective alternative is being explored. One such example is a Medicaid Waiver for keeping disabled patients in their homes and paying for social care support in order to keep patients out of skilled nursing facilities. Establishing care delivery which bridges rehabilitation services, medical services, and social support care for the disabled (12) in a more cost effective manner reflects the goals of the independent living movement. European countries have progressed further towards integrating medical and social care both within and outside the healthcare sector (13, 14).

Approximately $1.2 trillion was spent in 1999 on healthcare in the U.S. with projections reaching $2.6 trillion in 2010 (15). Health expenditures reached $2.3 trillion in 2008 representing 16% of the Gross National Product (16) with approximately 47% paid for through public funding. It has been projected that governmental programs will be paying more than 50% of healthcare expenditures

by 2012 (17). Thirty-one percent of the expenditures was spent for hospital care, 5.9% on skilled nursing care, 21% on physician and clinical care, and 10% on prescription drugs (16).Health expenditures increase with age and disability. Expectations on hospitals to lower their length of stays, to improve hospital discharge timing, and to provide more cost efficient care is increasing pressure on post-hospital services.

In a recent study of Medicare recipients, a comparison of costs between those who were treated by primary care physicians versus those who were cared for by hospitalists determined that hospital costs were lower in those cared for by hospitalists. This study concluded that1) Medicare care costs 30 days post discharge were significantly higher overall while hospital length of stay was lower, 2) patients were less likely to be discharged home, and 3) patients were more likely to have emergency room visits, readmissions and nursing facility visits (18).

The Centers for Disease Control (CDC) predicts that by the year 2030, seniors will demand even more long-term care, resulting in a demand for over 2 million beds in skilled nursing care (19). Governmental programs are the payer of first choice for those 65 and older. As age increases and health status decreases, healthcare expenditures increase. Additionally as the number of co-morbidities increases with age, so does the cost of care. Those individuals with five or more conditions incur nearly five times ($25,132) the average costs compared with those without chronic conditions ($5,186). Skilled care versus community care also results in a $5 to $1 ratio (1). More frequent hospitalizations

for shorter time periods (quicker and sicker) is the trend for aging adults in the U.S.(20). Rates of hospitalization for those 65 and older have increased from 306 per 1000 Medicare enrolleesin1992 to 336 in 2007. Correspondingly, hospital inpatient lengths of stay decreased from 8.4 in 1992 to 5.6 days in 2007.

There are significant pressures on the post-hospital sector to provide more complicated care to sicker patients and at lower reimbursement rates. As of 1997, there were 17,000 skilled nursing facilities in the U.S. providing health and residential care to over 1.6 million residents annually (21). Skilled nursing facility stays have increased significantly from 28 per 1000 Medicare enrollees in 1992 to 81 in 2007. The number of physician visits and consultations have also increased from 11,359 per 1000 Medicare enrollees in 1992 to 13,914 in 2005 while home healthcare visits dropped from 3,822 per 1000 in 1992 to 3,409 in 2007 (1).

As patients navigate healthcare transitions, the amount of information needed is increasing. As patients move across the continuum of care, types and formats of information will vary. Additionally, the need for information relevant to both medical and social care will increase. Information variability, types, and quantity tailored to the users' needs will challenge effective information transfer.

Patient-Centered Medical Home

The patient-centered medical home (PCMH) is a conceptual healthcare delivery model that originated from the pediatric healthcare system in the 1960s. With the continuing fragmentation of the healthcare delivery systems across sectors, disciplines, and care levels, the intent of PCMH was to provide an

organizational mechanism for managing care. In 2007 a set of joint principles on behalf of PCMH were developed by four national physician associations (22). The goal of this national consensus is to coordinate care across a patient's life span emphasizing quality and safety, access to care, use of heath care technologies and an appropriate incentive policy to achieve good patient outcomes.

The use of information technology is identified as a vital infrastructure to the care management of patients across a life span. The PCMH concept as applied to geriatric populations will need to be adjusted in order to integrate the social and medical care of the elderly. Issues of legal barriers as they relate to psychiatric or substance abuse information, differing formats of information including structured and coded data versus narrative text, and differing terminologies all play a role in achieving information integration in medical and social care environments.

Care Management

"Care Management" is a broad conceptual framework which encompasses management of chronic diseases such as diabetes (23), integration of the Chronic Care Model with clinical information systems (CIS) (24), or a combination of medical management practices such as utilization management, case management and disease management (25). Care management is defined as: "a set of activities designed to assist patents and their support system in managing medical conditions and related psychosocial problems more effectively with the aims of improving patients' functional health

status, enhancing coordination of care, eliminating the duplication of services, and reducing the need for expensive medical care" (26) (p. 1521).

Effective care management includes monitoring and feedback, completion of the care plan, and communication and collaboration of all team members (24). Recommended CIS components include clinical information access, accepted standards of care with reminder systems, and communication infrastructures between team members. Clinical information is but one component of the information transfer process following a hospitalization. Clinical decision making includes biomedical information necessary for the diagnostic and disease resolution component of medicine as well as contextual information (27).

Care management information in the posthospital world requires both biomedical and contextual information. Contextual information encompasses the patient response, his/her environment, and changes over time. Nonmedical care management includes issues of bowel and bladder management, pain management, restoration of function, behavioral management, risk management and end-of-life support. Information transfer which incorporates the contextual information of these care management processes are critical to the patient, the patient's caregiver as well as any health and social care services involved in the patient's care. In a recent publication by the HMO Workgroup on Care Management, a core set of data element are proposed as the necessary information elements for exchange across the continuum of care. This report included a Universal Health Plan and Home Health Authorization Form from the

Commonwealth of Massachusetts as an example of a care transition communication tool.

The Problem of Transitions in Care

The prevalence of transitions in care occurs frequently in the senior population, occurring at least once in 40% of patients and as frequently as five or more times in 6.3% of seniors (28, 29). Murtaugh and Litke found that close to 18% of the elders in their cohort had one or more transitions in a 2 year period. Women were more likely than men to have at least one transition and the probability of transition increased with age (30). Approximately one third of the transitions were from hospitals to a post-acute care or long-term care setting. Many of the hospitalizations were avoidable, with five conditions (heart failure, pneumonia, kidney or urinary tract infection, volume depletion including dehydration, and angina) accounting for 75% of potential avoidable hospitalizations. In one British study, older adults averaged 35 hospital days in the last 2 years of their lives. Additionally, the older adults averaged 4.2 admissions in the 3 years prior to death (31).

Transitions Cause Adverse Events and Poor Outcomes

Care transitions add significant complexities to assuring patient safety. The Joint Commission (TJC), the Institute of Medicine (IOM) and other accrediting bodies have recognized “transitions in care” as high-risk for the occurrence for adverse events. Recently TJC identified continuum of care issues and “hand offs” as high priority patient safety goals (32). The risk for adverse

events or poor outcomes for seniors within hospital and discharge care environments is well documented (30, 32-42) and transitions compound this risk.

An adverse event is defined as “an injury resulting from a medical intervention, or in other words, not due to the underlying condition of the patient”(43) (p.4). Adverse events are comprised of multiple types including but not limited to adverse drug reactions, medication errors, procedure related events, and high risk medications. Adverse events can also contribute to the reason for extended care either in hospitals or skilled nursing care.

Murtaugh and Litke conducted an assessment of the transitions through post-acute and long-term care settings looking for patterns of use and outcomes (44). Their study consisted of a two year longitudinal analysis of short-stay hospitalizations and postacute care settings for those 65 and older. The researchers determined that 22.4% of elderly patients transferred between hospital and long-term care experienced subsequent health problems. Frequent transitions from hospitals to home care results in high rates of emergency room visits, preventable hospitalizations, and institutional placement following discharge. They observed that: "A change in surroundings can be disorienting, and new providers may lack timely and complete information about a person’s medical history, prescription drug regimen, care preferences, and immediate care needs” (30) (p. 228).

Cooper found that upwards of 15.7% of long-term care resident hospitalizations were for adverse drug events (ADEs) (45). Boockvar and colleagues recently studied the adverse events due to discontinuations in

medications in patients experiencing care transitions and have identified 14 medications which were high risk for ADEs during the hospital-nursing home transfer process (46). In 2003, Moore and colleagues specifically studied medical errors related to discontinuity of care from inpatient to outpatient and its impact on re-hospitalization(47). The researchers concluded that a significant relationship existed between work-up errors and re-hospitalization within 3 months after the first outpatient primary care visit. This did not hold true, however, for medication continuity errors and test follow-up errors. The authors found a 42% prevalence of medication continuity errors, 12% work-up errors, and 8% test follow-up errors in the study population. The focus of the research was on a broad adult population and not limited to the elderly.

Readmission rates to hospitals post discharge is a particularly important indicator of quality of care and is currently a high priority for both the Veterans Administration (VA) and CMS. Greater than 45% of patients discharged from the hospital into the nursing home were readmitted from the nursing home back into a hospital within 180 days after the first admission (38). The problem of readmission has resulted in several strategies to reduce rates which include the publication of readmission rates by the CMS (48); randomized trials of care coordination (49); care management strategies for specific disease states (50, 51); and automated information exchange strategies (52-57).

Information Transfer Errors

Information transfer errors are a significant contribution to poor outcomes, especially for seniors. Information error types can include: 1) omission or

missing information;2) accuracy or correctness of the information; 3) precision or specificity of the information;4) quantity or sufficiency of the information;5) applicability or relevance; 6) completeness; 7) accessibility; 8) timeliness; and 9) reconciliation of the changes in the information (58). Sources of information are multiple and may come from the referring facility, other hospitals, skilled nursing facilities, home healthcare, patients or their family.

Patterson and colleagues documented the need for differing information to assure care continuity across patient units. She and her colleagues identified both critically needed universal information as well as differing specialty information by practice groups (59). For example, the occurrence of ADEs due to discontinuations in drug use and dose changes is highly dependent on information transfer. Boockvar and colleagues found that significant medication alterations in the hospital, resulted in an ADE occurring in the nursing home environment (60). Following the information trail of medication changes between, during and after transfers is but one example of the need for improved information transfer across sectors.

Prior Work to Improve Information Transfer

Current efforts to improve the use of information during the transition process from one institution to another are often referred to as “handoff” or “transitional care" strategies. Improvements in information transfer and handoffs have been achieved (61). Weiner and colleagues concluded that improved provider communication during transitions could improve safety and reduce costs (62). Several other researchers have recommended varying degrees of

information transfer (59, 63-66) in terms of quality, specificity, and timeliness in an effort to improve transfer outcomes.

There currently does not seem to be a consensus on what information should be transferred across industry sectors. Each sector continues to produce idiosyncratic requirements and unique forms specific to their needs and information infrastructures. While there is a movement to integrate within sectors through the use of Electronic Health Records (EHRs), integration across the continuum remains unsolved. Universal data exchange, described as a bi-directional data exchange (29), has been recommended. Such an approach shifts from a traditional discharge planning model to a patient transfer model with continuous and ongoing care management. Such a change in perspective would require planning to begin upon admission, incorporate patient preferences, and assess baseline functioning and social support (67).

Terrell and colleagues (64) tested the implementation of a one-page transfer document that contained 11 essential data elements. They found an increase of 19.31% in successful documentation as a result of the form being utilized. Their underlying assumption, although not directly tested, was that the increase in access to the information elements improved the ability of the emergency room to diagnose and treat the patient (64). Gaddis (65) built upon Terrell's initial list of eleven with both a larger and more specific set of over 40 data elements. Gaddis proposed a three-ring binder to be constructed as a matter of course for the patient's stay in the long-term care facility and then transferred to the hospital emergency service as needed (65). Construction of

such a document set would undoubtedly cost skilled care facilities time and money, possibly making this solution not economically feasible. He argued that the transfer of these data should be mandated by the regulating agencies based on the logic that patients admitted to skilled care will more than likely be transferred to the hospital at some point in their stay.

Information sent in the form of domain knowledge must be adapted for purposes of care management. Skilled nursing care requires sorting and reorganizing clinical information to answer not only medical management questions but also questions of a) resource management (specialized equipment, Intravenous (IV) therapy expertise, medication adaptations); b) risk management (isolation practices, skin integrity, fall precautions, vaccinations.); c) end-of-life support (Do not Intubate (DNI) or Resuscitate (DNI/DNR), Advance Directives, Power of Attorney (POA)); d) restoration of function (eating, Activities of Daily Living (ADLs), Independent Activities of Daily Living (IADLs); bowel and bladder retraining; e) pain management; and f) behavioral management (mental status, aggression, depression, psychiatric issues).

One example of reshaping domain knowledge into care management processes is pain management. Relevant data for pain management could include: 1) symptom information from a physician's history and physical; 2) surgical intervention information from an operative report; 3) functional information from a physical or occupational therapy evaluation; 4) medication order information from a physician order; 5) medication interactions and dosage risk information from pharmacy; 6) laboratory information of blood levels to

determine optimal dosing; 7) medication timing information from a medication administration record; 8) substance abuse information for risk assessment from a social work note; and 9) symptom relief and patient response to the medications from a nursing progress note. A cross-domain or horizontal view of and access to traditional domain-specific information is necessary in order to construct a care management plan for the patient to provide optimal pain management.

Information Technology as a Solution

Meaningful Use

The American Recovery Reinvestment Act of 2009 authorized financial incentives to eligible hospitals and physicians to become meaningful users of the Electronic Health Record (EHR). The core components of a hospital EHR include patient registration, computerized provider order entry, clinical documentation and clinical decision support. Financial incentives are being offered from 2011 to 2016 with the expectation that Medicare penalties for failing to meet meaningful use will begin in 2015. Correspondingly, Medicaid incentives are expected to be implemented from 2016 to 2021 (68). EHRs are believed to hold the key to improved patient outcome and healthcare delivery efficiencies by reducing redundancies, improving access to information, and eliminating written order errors.

A Rand study in 2005 estimated, that, if most hospitals and providers install health HIT systems, an annual savings of $77 billion could be achieved (69). Utilizing this model, an investment of $14-27 billion over 10 years could yield a $28 return of savings for every $1 invested. The deployment of EHRs is

an essential component of a comprehensive information technology infrastructure. Implementation of such an infrastructure will take time, is complicated, and will require work flow process analysis and redesign (68). According to the December 2010 Report to the President, The Centers for Medicare and Medicaid (CMS) is phasing in meaningful use criteria in three stages(70). These stages include:

Stage 1**:** Initiated in 2011 - electronic capture of health information in a manner that will support decision making, patient sharing and the ability to exchange information.

Stage 2: Scheduled for 2013 – requires health information exchange and higher levels of EHR use.

Stage 3: Scheduled for 2015 – improved outcomes of care through the use of HIT.

Improved information transfer across the continuum of care is consistent with both stage 2 and 3 of the meaningful use of EHRs as envisioned by CMS.

Incorporating meaningful use of information technology on behalf of seniors has challenges. Doctors who treat a high volume of elderly patients were found to be significantly less likely to adopt EHRs when compared to their counterparts (71). Additionally, physicians who function in small practices also have lower levels of EHR adoption (72). The use of information technology to provide home-based care incorporates an additional dimension to the more traditional models of hospital and primary healthcare. One example is the use of pervasive sensors to monitor vital signs and health indicators in combination with

a social care model (73). Implementation of the information technology solutions will need to be more closely studied, developed and implemented in order to assure relevant information transfer across the continuum of care.

Electronic Health Records

Dr. Brent James, in a lecture to University of Utah medical informatics students, stated, “We were not able to show a return on investment for our electronic medical record systems until we combined them with our clinical improvement efforts. Informatics builds the tools; clinical quality improvement builds the content” (74). Examples of such clinical quality informatics improvement tools are automated clinical protocols, decision support technologies, access to evidence-based medicine, and surveillance-based informed decision making. Informatic applications are varied and can focus on specific clinical medicine problems (75), build bridges between clinical content expertise and automation, improve clinical information transfer between sectors, develop robust public health clinical incident reporting (76) or improve the clinical care and research connection.

“Inadequate information flow, or an information logjam occurs when information that exists or should exist in the healthcare system and outside, is not available for optimal use or is not being used optimally by the system” (77) (p. 97). Historically, the collection of healthcare data was done through siloed or stove-pipe systems. That is to say, individual self-contained systems such as laboratory, pharmacy, radiology, and others would collect data for their specific production needs and automated processes and not for reporting purposes.

Additionally, in a traditional hospital setting, a physician order entry system (78) would not only drive the care but also the information associated with that care. Future designs of EHRs will require functionality that can support transitions in care, PCMHs, interdisciplinary and cross sector coordination and the continuum of care.

Minimum Data Set (MDS) for Skilled Nursing Facilities

The core information system in skilled nursing facilities is the Resident Assessment Instrument (RAI) which is a federally mandated instrument developed in response to Omnibus Budget Reconciliation Act of 1987 (OBRA-87) and has been implemented in over 90% of nursing homes since 1990. The RAI is comprised of several components and is intended to provide the basic structure for comprehensive assessments and care plans for nursing home residents (79). These components include the MDS, the Resident Assessment Protocols (18 RAPs), and utilization guidelines (80). The MDS is an assessment tool that collects functional and clinical information on the resident for purposes of care planning.

The development of the RAI included several clinical goals to: 1) develop an instrument whose main use was clinical; 2) focus on the whole person; 3) encourage restorative and rehabilitative care; and 4) to guide the care plan process (81). Version 3.0 was recently implemented nationally in October 2010. Version 2.0 with an addendum for a Version 3.0 has been mapped to standard terminologies of Logical Observation Identifiers Names and Codes (LOINC) and Systematized Nomenclature of Medicine – Clinical Terms (SNOMED- CT) (82).

The electronic transfer of information between hospitals and nursing homes is hampered by the differing intents (biomedical problem- solving versus clinical care management) of each of its systems as well as the various standards employed. The variety of standards in current use is described below.

Interoperability for Seamless and Safe Care

The ultimate challenge in the use of information technology in healthcare is for seamless and safe care. "Interoperable EHR systems are the most important enabling tools on the road to patient centered care, a lifeline for continuity of care and support to mobility of patients" (83) (p. 5).Interoperability is described as four levels (84). Level 0 consists of hard copy and faxed document transfers and has no interoperability. This level is the current status of information exchange across the continuum. Level 1 uses web browsers and email clients but with an inability to translate. Level 1 describes technical and syntactical interoperability but with no semantic interoperability. Level 2 indicates either unidirectional or bidirectional semantic interoperability of meaningful fragments (limited but coded information elements such as demographics, allergies, diagnosis, etc.). Level 3 denotes full semantic interoperability or co-operability where data is accessed, understood, acted upon, and can be automatically fed to the public health surveillance authorities.

Agreement on meanings and labels for those meanings, for example ontologies and lexicons, enable "faithful exchange of meaning between machines and between machines and people"(83) (p.12). "Interoperability is about continuous change management…requiring both permanent structures and the

organization of processes for consensus-building and cooperation among all actors involved" (83) (p. 5). Goossen identifies five types of standards necessary for exchanging nursing information. They include: 1) clinical standards; 2) terminology standards; 3) standardized information modeling; 4) process and communication modeling; and 5) technical standards for safe use of the technology (85).

One approach to establishing clinical standards is the use of Detailed Clinical Models (DCM) (86). DCMs are "small items of clinical information that are well defined and for which knowledge, data definition, vocabulary binding and information models for use in information and communication technology are standardized and reusable over domains, purposes, standards and implementations." (86). Hoy et al. in Scotland have been working on areas of motor functioning, family history, activities of daily living and urine continence for example (87). The term DCM originated from the work of Dr. Stan Huff of Intermountain Healthcare(88) and describes "the structure of clinical data that is stored and managed in electronic patient records, sent between clinical systems and referenced in decision support rules" (p. 202). A goal of this dissertation is to understand and identify the important information elements necessary to inform geriatric care management processes within a DCM on behalf of a level 3 semantic interoperability.

Vocabulary and Messaging Standards

The complexity of communication across the continuum of care is overwhelming. There are a number of messaging standards that are available

for use in the clinical systems that would improve the exchange of information (89). Additionally there are recommended vocabulary standards for the incorporation of clinical data into the electronic healthcare infrastructure (90). In an attempt to translate between and among standards the National Library of Medicine has developed a meta-thesaurus, one of three components of the Unified Medical Language System (UMLS), as a knowledge source for use in the electronic information infrastructure (91).

The use and mapping of these standards is varied across vendors, healthcare delivery systems, and healthcare sectors. The existence of these standards, however, is not a guarantee that they are being utilized. The Certification Commission of Health Information Technology (CCHIT) inspects health information products against integrated functionality, interoperability, and security criteria in order to assure implementation of these standards into commercial products. As of January 2011, only one hospital had been certified under the EHR Alternative Certification for Hospitals (EACH) (92). As of this writing 175 products have been certified since 2007 (93). Close to 60% of the products are for ambulatory care of varying sizes. There are currently no products that are certified in the areas of geriatric medicine, skilled nursing home care, home healthcare and limited hospital certified options. The lack of certified options will hinder interoperability across sectors due to issues of integrated functionality, interoperability, and security. Mapping vocabularies across sectors for semantic meaning is the next horizon for meaningful use and safe care.

Social Work Informatics

Social Work Informatics (SWI) works to integrate people, information technology, social work research and evidence-based practices. Coined in 2006, SWI was proposed as a new specialty for social work by Parker-Oliver and Demiris. The authors recognized the growing use of technologies in health and social care and recommended defining SWI as "a combination of computer science, information science, and social work designed to assist in management and processing data, information, and knowledge to support social work practice" (94)(p. 129). Social work has recognized the impact of information technology on social work practice in such applications as distance learning (95), teaching (96), use of the internet (97), and use of computer technology in social work practice (96). Additionally, the National Association of Social Workers (NASW) and the Association of Social Work Boards (ASWB) recognized the role of technology in social work practice and education. NASW has issued a set of ethical standards to guide the use of information technology in social work(98).

Although the transfer of information across the continuum of care has historically been a social work function known as discharge planning, the responsibility for safe transfers in care has broadened to include multiple disciplines and roles. However, despite their traditional role, there is limited research in the literature on the role of social work in designing informatic solutions that integrate social and healthcare delivery in the U.S.

Social Work Informatics with a focus on vocabulary standards is relatively new to the social work research world. Social work along with other allied health

domains such as physical therapy, occupational therapy, and speech therapy provide information in the form of unstructured or uncoded text. There is a history of research on the use of computers in human services delivery which has been documented by the Journal of Technology in Human Services(formerly known as Computers in Human Services) (99). Research preferences for this journal include research on IT and human services, Web-based teaching technologies, major applications, personal experiences with human service IT, human service IT policies or issues, and descriptions of new technologies, applications, and human service IT projects. The focus to date has been in the human service domain and not in healthcare. Additionally the role of social work researchers has mostly been on the "use" of information technology rather that its development. Issues of terminologies, standards, communication, integration, and interoperability are largely undeveloped and underrepresented in the current research agenda.

Social Work Informatics offers a cross-sector and interdisciplinary perspective on behalf of patient care and can play a role in helping to define the necessary components for future semantic interoperability. The information needs associated with the transfer of care for older adults involves many of the knowledge domains associated with social work practice including resource management, resource brokerage, public assistance, family and patient support. In addition boundary-spanning across disciplines and organizations on behalf of patients is a sanctioned social work strategy and is consistent with social work practice (100). Facilitating interoperable information transfer across sectors on

behalf of patient safety and improved patient outcomes is a highly relevant and important emerging social work informatic role (94).

Conclusions

Hospital care, long-term care, and community care are vital components of the continuum of care (101) and finding common ground across these sectors is challenging. Increased complexity and economic pressures in patient care has shifted the focus of discharge planning from a community placement to an institutional perspective of discharge readiness or revenue optimization. Patients are discharged more quickly, placing additional expectations on the receiving entity**.** The alignment of goals, enhanced control, and co-agency across the continuum of care needs to be addressed in order to improve patient outcomes. Bridging variations requires: 1) recognition and understanding of the dissonance between the sectors; 2) a clear understanding of the inter-professional information needs to develop a system wide sustainable solution; and 3) an understanding of what constitutes common ground (102).

CHAPTER 3

STUDY 1: CLINICIAN EXPERIENCES WITH INFORMATION TRANSFER

The intent of this study is to explore experiences with information transfer among healthcare professions across the continuum of care.

Research Aim

Information Transfer Experiences

Aim #1.1

#1.1.1: Characterize the experiences of information transfer across the continuum of care among and between interdisciplinary healthcare professionals using a Joint Cognitive Systems model.

Methodology

Qualitative techniques were used to analyze interviews of clinicians across different disciplines and healthcare sectors regarding their experiences with the information transfer process. The goal of this study was to capture direct experiences of healthcare professionals with information transfer barriers, enablers, process, and information needs. (103)

Design and Setting

A qualitative design was deployed using semi structured interviews. Providers from the Salt Lake City Veterans Administrative Medical Center (VAMC), University of Utah Medical Center (UUMC), and a five state nursing home system located in the Intermountain West region of the United States who received patients from the referring systems were recruited.

Participants

Respondents who were active in the geriatric transfer process were recruited (n=16) from medicine, nursing, pharmacy, and social work and from three healthcare sectors (hospitals, skilled nursing, and community care). A snowball recruitment strategy was used resulting in a purposive subgroup (Table 1) sampling design(104). IRB approval was gained from UUMC and the VAMC.

Table 1.Distribution of Healthcare Professionals across Sectors and Disciplines

Discipline	Sector	Participants	Total Discipline
Medicine			4
	Hospital Care	1	
	Skilled Nursing	2	
	Community Care	1	
Pharmacy			4
	Hospital Care	1	
	Skilled Nursing	2	
	Community Care	1	
Nursing			4
	Hospital Care	1	
	Skilled Nursing	2	
	Community Care	1	
Social Work			4
	Hospital Care	1	
	Skilled Nursing	2	
	Community Care	1	

Participant selection criteria included: 1) current practice experience with aging adults; 2) a minimum of 2 years of experience with the healthcare transfer process; 3) current employment in relevant sector positions; and 4) representative of medicine, pharmacy, nursing, and social work.

Procedures

A set of semistructured and open-ended interview questions was developed to loosely model the JCS model, specifically focused on *goal alignment*, *control* and *co-agency*. The interview instrument can be found in Appendix B. The questions covered participant's experiences with the transfer process including notification, timing, barriers, facilitators and sources of information. Information-related questions included needed information elements, typical sources, information difficult to get, how information from outside sources is obtained, barriers, timing, and common information errors. Interviews required from 30 to 75 minutes; were digitally recorded, transcribed into word processing documents; and maintained on a password-protected USB drive. Transcripts were managed using qualitative analysis software (105).

Analytic Strategy

The overall analysis process was iterative and cyclic. An initial content analysis was conducted independently by a social work and biomedical informatics researcher and by a nursing and social psychology researcher experienced in qualitative research. Phrases and words perceived to be relevant to the key theoretic constructs were identified. Both researchers reviewed the

constructs and associated quotations repeatedly and pre-codes were identified and aggregated into categories in accordance with Patton's recommendations for content analysis (106).

Findings

Determinants and supporting evidence related to the individual concepts of the Joint Cognitive System model are presented in Tables 2-4. Cross-sector and interdisciplinary perspectives are provided as evidence of common themes.

Goal Alignment

Two goal alignment subthemes including access to goal relevant information and the absence of integrated information are presented in Table 2. Representative quotations provide qualitative support to each sub theme. Cross sector and interdisciplinary perspectives are presented.

Control

Four subthemes related to control determinants and supporting quotations are presented in Table 3. The subthemes include: 1) increased complexity; 2) lack of systematic work processes; 3) loss of clinical control; and 4) feedback and feed-forward.

Co-agency

Three subthemes of the co-agency determinants are presented in Table 4 and include: 1) interdependence and trust; 2) interrelated actions and expertise; and 3) coping responses.

Table 2. JCS Goal Alignment Determinants

Emerging Themes	Quotation Highlights
Access to goal relevant information	"In the nursing homes...we have limited information from the hospital" (SNF/MD) "...there are many times we can't even read the drug name and you just got to play the matching game" (CC/PHARM) "...trying to sort it, hunt around and find all the information" (CC/NURS) "...there are times when the diagnoses and medications…are not well coordinated or well-articulated." (SNF/SW)
Absence of integrated information	"there is sparse or no information or the information that is sent is non-sequitur information. So usually, it is chaos" (SNF/MD) "We try and combat the inconsistencies and the lack of information that the nursing home will receive from the hospital" (SNF/PHARM) "AM hospital nursing shifts "turn and burn" so many patients that they cannot know everything" (SNF/NURS) "On behavioral patients, uh, substance abuse, sometimes we don't even know they've got you know, their family…the social histories are very limited." (SNF/SW)

AC - Acute Care, CC - Community Care, SNF - Skilled Nursing Care MD - Physician, PHARM - Pharmacist, NURS - Nurse, SW - Social Worker

Table 3. JCS Control Determinants

Emerging Themes	Quotation Highlights
Increased complexity	"So now you're getting sort of a jigsaw puzzle in which you are having to use your thinking and your own diagnosis process which is almost second guessing." (SNF/MD) “I mean the nursing home patient of 10 years ago is our assisted living and the medical surgical patient of 10 years ago is in our nursing homes." (SNF/PHARM) "They're getting kicked out of the hospital big time so home health has become a hospital without walls." (AC/NURS) "It was hard to integrate the different disciplines, putting in their input and making ...a solid tool together." (SNF/SW)
Lack of systematic work processes	"From that day, the day of discharge, it might be two or three days later." (CC/MD) "Within hours" (SNF/PHARM) "When the patient is ready to go, orders are written...I would hope it only take an hour." (SNF/NURS) "And that notice is sometimes as short as a day, uh which, which is very discouraging to me." (SNF/SW)
Loss of clinical control	"The balance is currently in terms of revenue stream that drives the system, not quality patient care" (SNF/MD) "And we do have formulary considerations. Unfortunately the bottom line can, you know, drive some choices." (SNF/PHARM) "Clinically, can we take them and uh, you know you hate to have it come down to money but is there a payer source?" (SNF/NURS) "...this tool is one that is also supposed to be filled out every time we do a nursing home placement, a home health placement, uh, an adult day healthcare placement...but it really is a monitoring tool in my estimation." (SNF/SW)

Table 3. Continued

Emerging Themes	Quotation Highlights
Feedback and Feedforward	"The patient shows up and then you wonder what is happening." (SNF/MD) "...a lot of times the doctors don't even know the patient went to the hospital. It could be a one day stay. It could be a three week stay. (CC/PHARM) "...they might have been this on this day but a week later they were this, but if they just get this, you know, this ancient piece of information...oh no, we don't want that but you know, this is what has happened over the last seven to 10 days". (SNF/NURS) "I don't know if people are too busy or what so, you know, it, they don't do it. But all I know is if we don't get the information, I shouldn't say, we don't ever get it. We get it on occasion but not enough for me to not make it a big issue, you know." (SNF/SW)

AC - Acute Care, CC - Community Care, SNF - Skilled Nursing Care
MD - Physician, PHARM - Pharmacist, NURS - Nurse, SW - Social Worker

Table 4.JCS Co-agency Determinants

Emerging Themes	Quotation Highlights
Interdependence and trust	"... there are omissions of what patients were on and are supposed to be on. So it can be quite confusing." (SNF/MD) "There are a lot of loose ends that the nursing home will just figure that out." (SNF/PHARM) “Wound VACs are a huge issue…some skilled nursing facilities are very good at handling wound VACs, some are not.” (AC/NURS) "...sometimes the new ones (social workers) are hopping and popping and they're writing. It's just like wow, look at all this information on this person." (SNF/SW)
Interrelated actions and expertise	“…so everybody does their own thing which actually takes up more time…trying to piece together this jigsaw puzzle...to perceive it on the front end is very different than on the receiving end.” (SNF/MD) "...only where the RNs are more trained in IVs does the communication between the nursing home and discharge planner get tighter." (SNF/PHARM) "SNFs are dependent on what the hospital is willing to share." (SNF/NURS) “Sometimes people withhold information from nursing homes so that we’ll take patients because sometimes we get some very troublesome patients and its omitted…And you’ll find that what they told you and what they faxed over is two different things.” (SNF/SW)
Coping responses	“I’ll use an example of a nursing home that’s taken a lot of acute patients…I think they succeed or they help them be more successful because they have compartmentalized that group of patients.” (SNF/PHARM) “I mean I know that they need to find a placement for the patient, but unfortunately keeping information close to their breast has created distrust…And you look for clues they are deceiving you” (SNF/NURS)

Table 4. Continued

Emerging Themes	Quotation Highlights
	"I'm like this, this doesn't seem right to me. Would you mind sending me the social notes or the social service assessment …So we get a couple of notes, Uh ok, would you mind sending the nursing notes ,, What's going on here…you feel like you are getting the shaft" (SNF/SW)

AC - Acute Care, CC - Community Care, SNF - Skilled Nursing Care
MD - Physician, PHARM - Pharmacist, NURS - Nurse, SW - Social Worker

Additional Interview Findings

Interviewees responded to the question of who participates in the transfer process with comments such as: “the unit clerk” (SNF/MD); “the nurse case manager or the social worker depending on the facility” (SNF/NURS); “depending on I guess the acuity of that patient, uh, either myself would get involved or one of the other two coordinators” (SNF/NURS); and “if it, you know, it’s just kind of a slam dunk, most likely they’re just going to call the facility directly” (SNF/NURS). There appeared to be a known, although not explicit, hierarchical practice driven by patient acuity and complexity of who should be involved in the notification process. Additionally, problems of patient behavior management and financing would drive facility decision-making but were not made known to the medical director.

Commonly, when the hospital physician discharges the patient to long term care services, it is a service representative who receives the discharge request. This representative might be a nurse, social worker, administrator, clerical support staff, or admissions staff, but not another physician. According to the participants, physician-to-physician direct communication is rare and the receiving entity representative varies by discipline, capacity, and control.

Narrative responses to the question of how the transfer recipient was notified included: “normal discharge orders come through the fax machine” (CC/PHARM); “there are various ways. It is not consistent” (CC/MD); “we get a phone call or a page from a resident or an intern to say we’re sending Mr. so and so home, wanted you to be aware of it” (CC/MD); “obviously over the phone”

(SNF/MD); or mostly communicated verbally by phone (SNF/NURS). Each facility employed multiple methods for notification with redundancies such a faxed document with follow-up phone calls and the request for more documents.

Conclusions

Several conclusions can be drawn from Study 1. First, there are significant differences in perspectives between clinicians working in the hospital versus the long-term care settings. Hospital representatives perceive that they are providing necessary information to nursing homes. Nursing home staff, on the other hand, perceives that hospitals are withholding critical information that they need.

Differing world views between hospitals and nursing homes account for some of the differences. For example, hospital goals are focused on patient triage, stabilization, diagnoses, clinical problem solving and intervention. Long term care goals however are concerned with recovery, restoration of function, end of life support and quality of life care. Time constraints vary by measures of days in hospital care and weeks and months in long-term care. Information being sent out by hospitals is organized around roles and clinical domains (e.g., cardiology notes contain information about cardiac problems by physician specialists in that area). In contrast, nursing homes in addition to medical management information want information about behavioral management, end of life directives, infections, mental status and risk management issues.

Hospital patient care is directed at identifying a diagnosis based on knitting together measurement values, symptoms and medical knowledge. Once

the problems are determined and treatment has been instituted, discharge is the next goal. The nursing home environment, on the other hand, is a “home environment” and sustained living is the goal. Nursing home staff are charged with the responsibility to interpret the medical findings and directions from the hospital and to translate these findings into the care management environment of the nursing home. These differences in approach and information needs became very apparent in the qualitative interviews. The information systems supporting each environment reflects individual sector priorities and do little to support the translation of information from hospital “ease” to nursing home “ease.” Communication of patient care needs between sectors via the discharge summary was commonly cited as useful and highly desirable, but was usually not received in a timely fashion. Discharge orders are transferred through the fax machine, by a phone call or a page; via an alert from the hospital computer system; or verbally from the nurse/physician liaison, the discharge team, a geriatric social worker or nurse practitioner referral.

Information transfer in a seamless and safe manner across the continuum is challenged by the need for interoperability (107). In-depth understanding of how this challenge manifests itself in a clinical environment is imperative for creating solutions. The experience of information transfer as described by the study participants lacks seamlessness and safety. Hospital representatives report copious amounts of information transferred while community and nursing home representatives report a withholding of information by hospital representatives.

CHAPTER 4

STUDY 2: PATTERNS OF INFORMATION TRANSFER ACROSS THE INPATIENT AND NURSING HOME CARE CONTINUUM

The results of Study 1 informed the Study 2 research aims in accordance with the Health Information Technology Evaluation Model. Study 2 examines the patterns of information transfer at the document, care management, clinical concept and patient outcome level. The need for improved information transfer continues to be demonstrated in a variety of clinical contexts and by multiple disciplines (108-111).

Study 2 consists of four components. Part 1 addresses information transfer at the document level and highlights the forms and structures by which information passes across settings. Part 2 addresses information transfer at the care management level as an example of the breadth of information needed by post-hospital discharge recipients. Part 3 drills down to the clinical concept level to provide a clearer picture of the content of information transfer. Part 4 analyzes information transfer from the perspective of patient outcomes (death, Emergency Room (ER) visits or Hospital readmissions, extended nursing home care and discharge to assisted living and home).

Research Aims

Part 1

Aim #2.1. Information transfer at the document level

2.1.1: Describe the pattern of information transfer at the document type level.

2.1.2: Assess the quality of information transfer at the document level between patients with and without ICD9 coded mental disease diagnoses.

Part 2

Aim #2.2. Information transfer at the care management level

2.2.1: Describe the pattern of information transfer at the care management level.

2.2.2: Assess the quality of information transfer at the care management level between patients with and without ICD9 coded mental disease diagnoses.

Part 3

Aim #2.3. Information transfer at the clinical concept level

2.3.1: Describe the pattern of information transfer at the clinical concept level.

2.3.2: Assess the quality of information transfer at the clinical concept level between patients with and without ICD9 coded mental disease diagnoses

Part 4

Aim #2.4.Impact of information transfer on patient outcomes

2.4.1: Assess the relationship between information transfer and positive and negative patient outcomes at the level of:
a) ICD9 coded mental disease diagnosis;
b) Documents;
c) Care management.

Methodology

Settings

Two hospital systems consisting of the University of Utah Medical Center (UUMC) and the Veteran Administration Medical Center (VAMC) in the Intermountain West were recruited. IRB approval was obtained from both institutions to conduct chart reviews of patients discharged during the time period 2006 to 2008from each system into a nursing home placement in the Salt Lake City, Utah area. The Avalon Healthcare Group (AHCG) served as the nursing home system and the University of Utah IRB provided oversight to the research. The Avalon Group is comprised of skilled nursing facilities located in 5 intermountain states. Five nursing homes in the Salt Lake City were initially selected from the Avalon system. Due to the concentration of eligible patients, VAMC contract constraints, and the mix of patient types the final data collection activities took place in the Woodland Nursing Home medical records department

Sample Description

Sample cases were randomly selected from the time period of Jan 1, 2006 to Dec 31, 2008. Selection criteria included patients 65 and older, discharged from one of the two IRB approved hospitals to one of the five Avalon Healthcare Group nursing homes located on the Wasatch front of Utah. Each hospital discharge list was separated into cases with patients who had ICD-9-CM (290-311) mental disease diagnostic codes and those without mental disease diagnostic codes within the first 10 diagnoses. A set of random numbers was generated and assigned to eligible VAMC and UUMC patient cases. Using an

alpha level of 0.05 and a moderate effect size of 0.5, a sample size of 120 was identified as necessary to achieve a one-tailed observed power of 0.859 and two-tailed observed power of 0.774.

Close to 1200 patients discharged from the University of Utah Medical Center (UUMC) to Wasatch front nursing homes between 2006 and 2008 were eligible for selection. Of the total patients identified, 16.2% (192) were matched to patients discharged to one of the five eligible Avalon nursing homes. Seventy-three percent of those matched to the Avalon nursing homes had no ICD9 coded mental disease diagnosis in the first 10 diagnoses while twenty-six percent did. Each group was assigned a random number and a set of 30 cases per group were selected (see Figure 3).

Seventy-one patient cases discharged to the five Avalon facilities from the Veterans Administration Medical Center (VAMC) were identified. The VAMC limits its skilled nursing care contracts for skilled nursing home services and only three of the original five eligible Avalon nursing homes were allowed to receive discharges from the VAMC. Of the 71 patients matched to Avalon eligible facilities, 52% had mental disease diagnoses and 48% did not within the first 10 diagnoses. The cases were assigned random numbers within each diagnostic category and a total of 30 cases from each group were randomly selected.

A final combined list of eligible discharges resulted in 63 cases after one case was eliminated due to not meeting criteria (not discharged from hospital but referred from VA outpatient system). Concentration of discharges from both hospitals to one of the eligible nursing home (Woodland Nursing Home) was

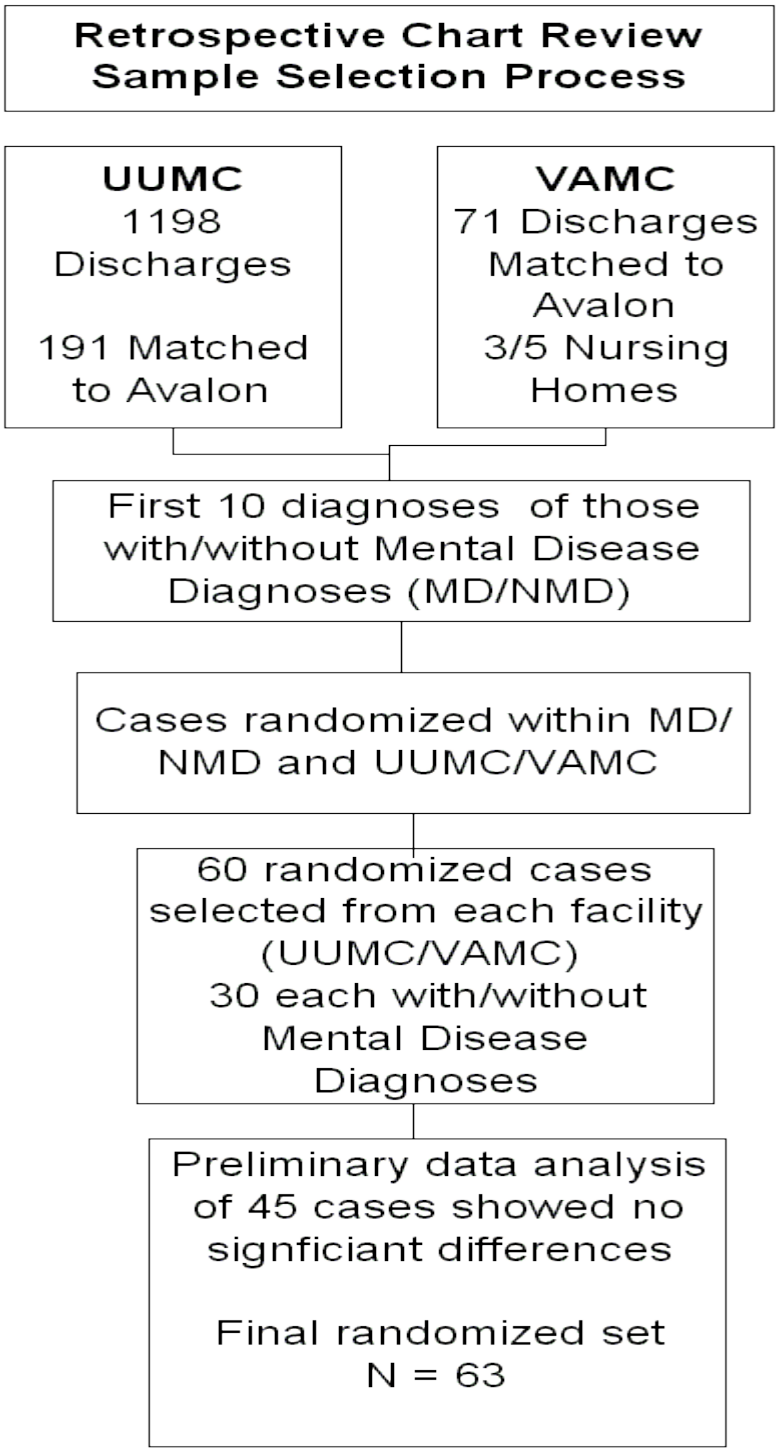


Figure 3. Description of Case Selection Process

selected as the nursing home placement site to conduct the research due to the VA nursing home contract constraints and the small numbers of patients at the other two eligible nursing homes.

The final distribution of participants discharged from hospitals to Avalon Woodland skilled nursing care was 49% VAMC cases and 51% UUMC. The overall distributions by hospital and by ICD9 coded mental disease status are found in Table 5. ICD-9-CM codes identified in the sample are displayed in Table 6.

Procedures

In Part 1, documents transferred to the nursing home in each medical record from the referring hospital were reviewed, counted, analyzed, and entered into an Excel spread sheet. The number of documents by document types were recorded and analyzed and a subset of document types were described and analyzed by patient outcome. Part 2 of the study analyzes information transfer at the care management level. Part 3 further analyzes information transfer at the clinical concept level. Part 4 assesses the information transfer impact on patient outcomes at the document l, care management, and clinical concept levels.

Table 5. Distribution of Cases across Settings and by Diagnoses

Diagnostic Category	**VAMC**	**UUMC**	**Total**
ICD9 coded Mental Disease Diagnosis (MD)	17	15	32
ICD9 coded Non Mental Disease (NMD)	14	17	31
Total	31	32	63

VAMC - Veterans Administration Medical Center
UUMC - University of Utah Medical Center

Table 6. ICD9 Coded Mental Disease Diagnoses found in Data Set

Code	Description	Code	Description
290.0	Dementia	296.7	Bipolar disorder
290.21	Senile dementia with Depressive features	296.99	Episodic mood disorder
290.40	Vascular dementia, uncomplicated features	300.0	Anxiety
291.81	Alcohol withdrawal	300.02	Generalized anxiety
293.82	Transient organic psychotic disorder	300.9	Unspecified non-psychotic mental Disorder
293.9	Organic psychosis	303.90	Unspecified alcohol dependence
294.1	Alzheimer dementia	305.0	Alcohol abuse
294.11	Dementia with behavioral Disturbances	309	Adjustment disorder with depressed mood
294.8	Other persistent mental disorder	309.1	Prolonged depressive reaction
294.9	Unspecified persistent mental disorder	309.28	Adjustment disorder mixed anxiety and depression
295.90	Unspecified schizophrenia	309.81	Post traumatic disorder
296.30	Major depressive disorder	311	Depressive disorder

Data Collection

The LINC transfer document was used as a model to define the necessary information elements (see Appendix C). The LINC was developed through a grass roots initiative in the state of Utah by healthcare representatives and has been endorsed by several community organizations (Health Insight, Utah Hospital Association, Utah Healthcare Association) as well as state and federal agencies (Utah Department of Health, CMS, Denver office).

Description and Measurement of Dependent Variables

Four outcome variables, including death, ER visits or re-hospitalization, extended skilled nursing home care, and discharge to assisted living or home were assessed in relation to information transfer. A 90-day time period of outcomes following discharge from the hospital was selected as the time frame for observations.

Analytic Strategy

Descriptive, nonparametric, and parametric analyses were conducted (112) and consisted of descriptive analyses, Chi-square, Fisher Exact, Student t, and ANOVA.

Sample Description

Several analyses were conducted to determine significant differences in the demographics of the randomly selected samples. No significant differences were found in age or gender (Table 7). Distributions of outcomes (death, ER visits or re-hospitalization, extended skilled nursing care, or assisted living/home)

within the sample at 30, 60,and 90 days are presented in Figure 4.The proportions of final outcomes in the sample at 90 days are presented in Figure 5.

Table 7. Case Demographics

Variable	Total Sample	MD	NMD	P value
Sample Size	63	32 (50.7%)	31 (49.2%)	
Average Age	78.71	78.09	79.03	0.65
Gender				
Male	44 (70%)	22 (68%)	22 (70%)	0.53
Female	19 (30%)	10 (31%)	9 (29%)	

MD –ICD 9 Mental Disease Diagnoses
NMD - Non ICD9 Mental Disease Diagnoses

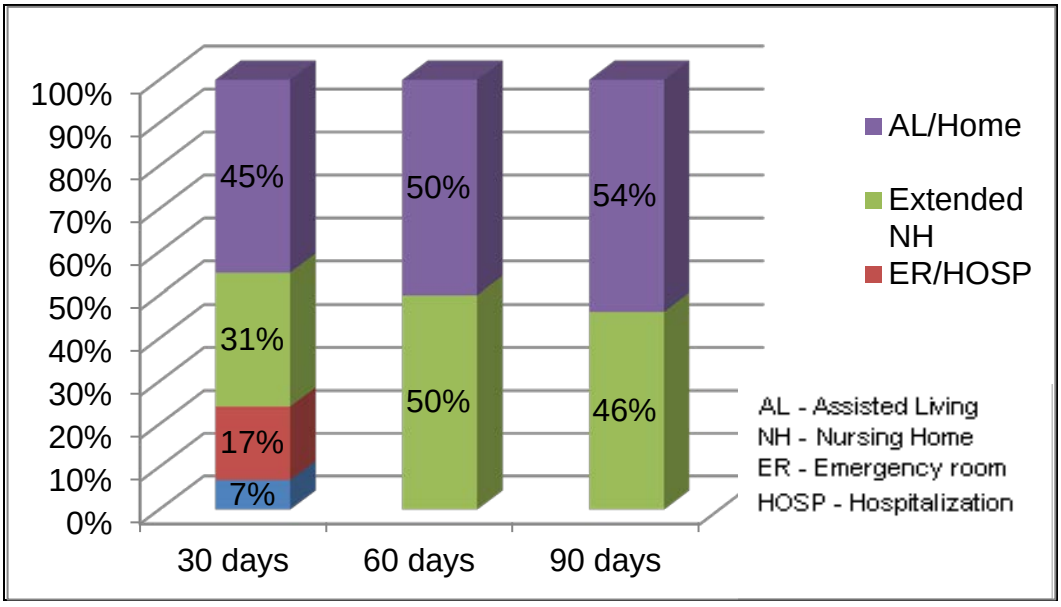


Figure 4. Distribution of Outcomes at 30, 60, 90 Days of Nursing Home Admission

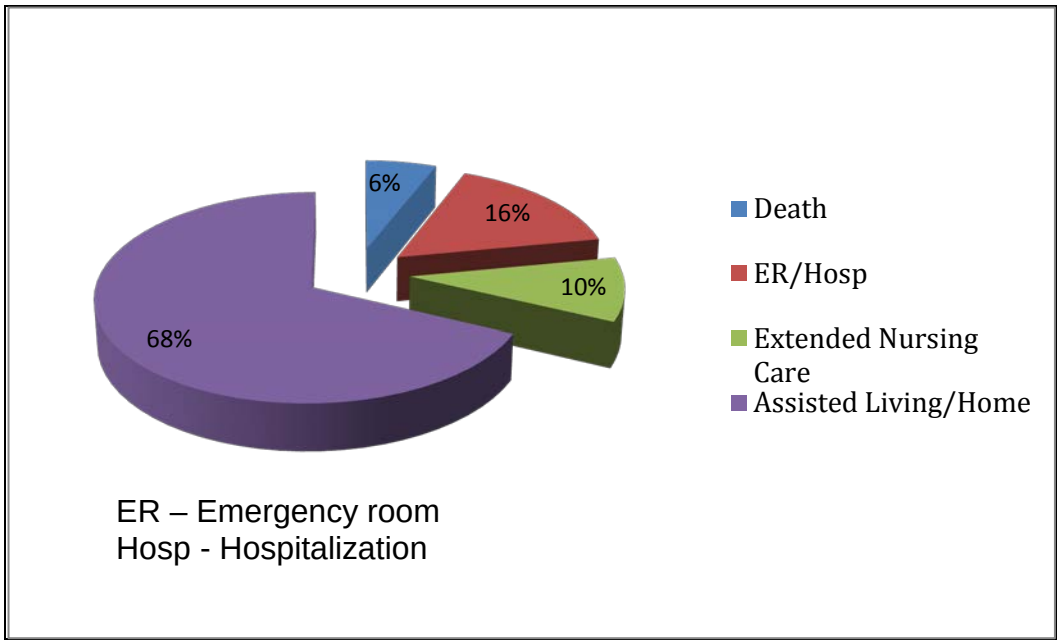


Figure 5.Distribution of Final Outcomes at 90 days

Findings

Part 1

Aim #2.1. Information transfer at the document level

#2.1.1: Describe the pattern of information transfer at the document level

Number of documents. The total number of hospital documents across hospitals found in the nursing home medical record was 565 for 63 patients resulting in a mean of 8.9 per patient and a standard deviation of 4.85. The mean number of documents transferred from VAMC was7.26 with a standard deviation of 2.72 compared to an average of 10.63 and a standard deviation of 5.84 from the UUMC. Differences between hospitals were significant (t_1 = -2.92; p=.005).

Types of documents. Physician medically-related documents represented 40% of the total documents counted with nursing documents representing only 6% overall. Proportions of all documents are found in Table 8.

Table 8. Proportion of Document Types

Document Type	Number of Documents	Percentage
Physician/Medical	225	40%
Allied Health	148	26%
Administrative	75	13%
Reports	58	10%
Nursing	32	6%
Medication Specific	17	3%
Other	10	2%

Final discharge orders, physician staff notes and “history & physicals” were the most frequent document type of the total number of medically-related documents (see Figure 6).Final discharge orders and “history & physicals” were found in most patient records while discharge summaries were present in slightly over a third of the patient records.

Allied health documents comprised 26% of the total document count and included physical therapy, nutrition, occupational therapy, speech therapy, respiratory therapy, social work and dentistry. Figure 7 presents the proportion of documents by allied health document type.

Administrative documents represented 13% of the document count and were present in all patients in some form. Multiple report types were available in the document set and were labeled according to the hospital context. For example, there were specific report types for medical students called a "rounds" report. An "all results" report included medication lists, operative reports, and some selected laboratory reports was also a “reports” document type. A "summary report" was the most frequent of the document types and was present in about half of the patient records, providing an overview of the patient's condition. “Other” documents found in the nursing home medical records included ambulance run sheets, end of life documents, immunization records, and behavioral medicine consultations

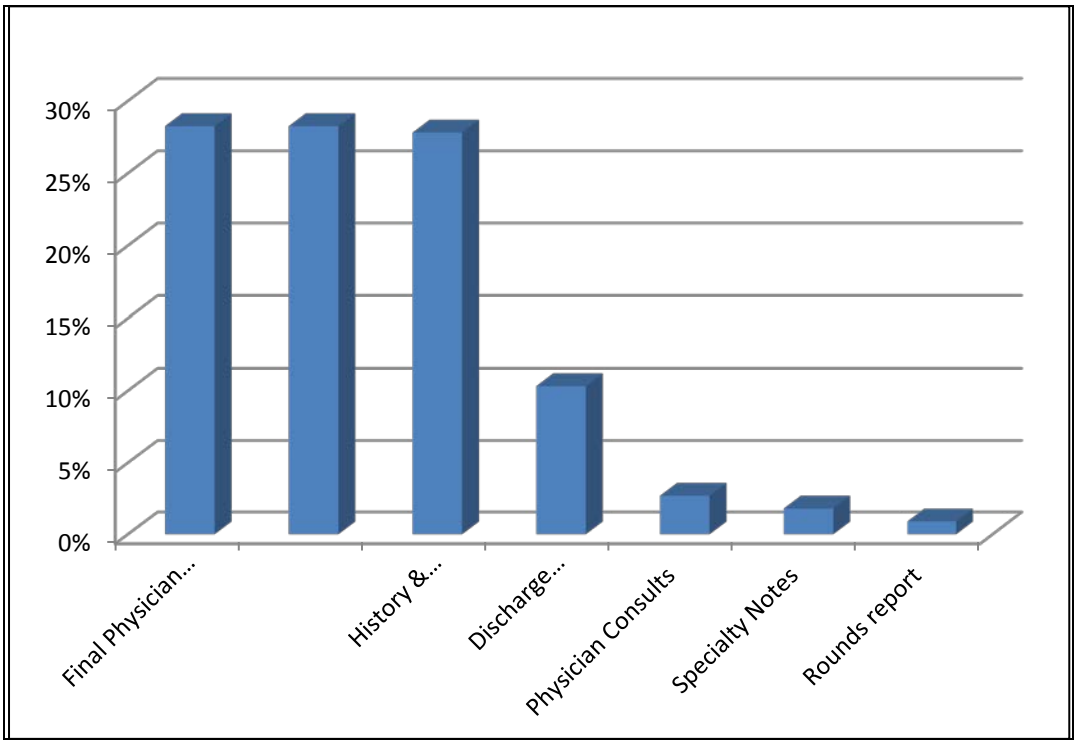


Figure 6. Medically-Related Documents Type

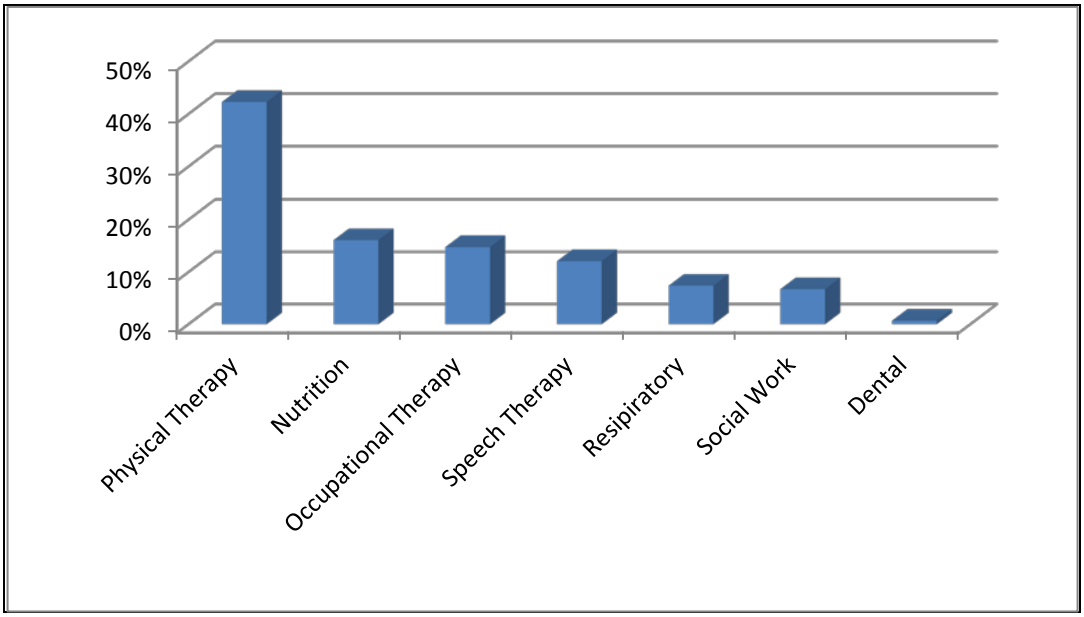


Figure 7. Proportion of Allied Health Document Types

Nursing assessments comprised 6% of the total document count and dominated the distribution of nursing document types. Nursing care documents of any type were present overall in less than one-fifth (17%) of the patient records. Multiple nursing document types were available depending on the patient's condition. Medication-specific documents varied depending on the time period of the patients discharge. For example, reconciliation lists were used with patients discharged in 2007/2008 but not always evident in those patients discharged in 2006, reflecting the implementation of national accreditation standards with respect to patient safety goals (113).

#2.1.2: Assess the quality of information transfer at the document level between patients with and without ICD 9 coded mental disease diagnoses

The qualitative results from study 1 indicated a concern regarding the lack of behavioral information coming from the hospital. When evaluating the differences in mean number of documents transferred between those patients with mental disease diagnoses and those without, no significant differences were found (t_1 = -0.03; p= 0.98). Those with mental disease diagnoses averaged 8.97 documents with a standard deviation of 4.71 and those without a mental disease diagnosis averaged 9 documents with a standard deviation of 5.07.

A second analysis was conducted to determine if the presence of a mental disease was associated with the number and type of documents transferred. The proportions of the presence by document type between those with ICD 9 coded Mental Disease (MD) versus Non Mental Disease (NMD) diagnoses are presented in Table 9. No significant differences (F1= 0.05; p = 0.82) were found

Table 9. Document Proportion with or without ICD 9 Coded Mental Disease Diagnoses

Documents	MD proportion	NMD proportion
HP < 30 days	0.97	0.87
Discharge summary	0.50	0.26
Nursing Assessment	0.21	0.13
Nutrition	0.21	0.39
OT Evaluation	0.21	0.22

MD - Mental Disease NMD - Non Mental Disease HP - History and Physical OT-Occupational Therapy

overall between those with mental disease (mean = 0.420, standard deviation = 0.332) and those without (mean = 0.374 and standard deviation = 0.292). A third analysis was conducted by individual document type to determine if there were differences between patients with or without ICD9 coded mental disease diagnosis. Findings of this analysis are presented in Table10. Significant differences (χ^2 =3.91; p =0.04) were found for discharge summaries in favor of those with ICD9 coded mental disease diagnosis.

Table 10. Selected Document Types and Patients with or without ICD9 coded Mental Disease

Document	# MD	# NMD	Fisher Exact	p value
HP	31	27	2.06	0.16
DS	16	8	3.91	0.04**
NA	7	4	0.88	0.27
OT	7	7	0.00	0.64
Nutr	7	12	2.12	0.11

* p ≤ .10, ** p ≤ .05, *** p ≤ .001

Part 2

Aim #2.2. Information transfer at the care management level

#2.2.1: Describe the pattern of information transfer at the care management level

In order to more clearly understand the information needs of nursing homes, LINC information elements are categorized into a care management framework. These care management processes include bowel/bladder management, end of life support, function restoration, medical management, mental status/behavior management, pain management, and risk management. Information elements from the LINC transfer form are aggregated into care management categories and are found in Table 11. Information elements categorized within the care management categories are found across multiple documents and are presented in Table 12.

#2.2.2: Assess the quality of information transfer at the care management level between patients with and without ICD9 coded mental disease diagnoses

Differences between those with and without ICD 9 coded mental disease diagnoses in care management processes were analyzed using the Student t test. Proportions of information present and not present within care management processes were calculated and compared. These findings are presented in Table 13. No significant differences were found between groups.

Table 11.NonmedicalCare Management Processes and LINC Information Elements

Care Management	**LINC Information Elements**
Bowel/Bladder Management	Bowel (Continent), Last BM date , Diarrhea, Ostomy Type, Change date, Bladder (Continent), Catheter/Urostomy type, Inserted date , Dressing changed
End of Life Support	Healthcare Decision Maker Name , Healthcare Decision Maker Phone , DNR/DNI , FULL CODE, Advanced Directives ,If Yes, indicated type, Living Will, Power of Attorney, Special POA
Function Restoration	Assistive Devises, Sent With Person, Dentures Sent , Glasses Sent Sensation, Amputation , Prostheses, If Yes Was Prostheses Sent, Contracture , Paralysis , Walking, Toileting ,Turning-bed Mobility, Bathing , Dressing , Eating Transferring ,Physical Therapy Treatment Received/Ordered, Occupational Therapy Treatment Received/Ordered, Speech Therapy Treatment Received/Ordered, Respiratory Therapy Treatment Received /Ordered
Mental Status/Behavioral Management	Mental (Dementia, Confusion, Aggression), Speech, Hearing ,Hearing Aid Sent, Able To Communicate , Speaks English , Religious Affiliations, Cultural/Literacy/Family Issues
Pain Management	Intensity 0-10 , Time of last Pain Med (hour, minutes)
Risk Management	Appetite , Diet Type, Impairments, Weight (Lbs), Height (Ft/Inches), Allergies, Pneumonia vaccination, Tetanus, Tb Skin Test , Skin Intact , Other Uncontained Body Fluids/Drainage, Drain, Wound Care, Infection , If Yes, Culture (MRSA, VRE, C-diff, Other), Fall History, Aspiration, Seizures

Table 12. Nonmedical Care Management Processes, Information Elements and Documents

Care Management Processes	**# information elements**	**# individual documents**
Bowel & Bladder Management	9	16
End of Life Support	6	18
Function Restoration	25	27
Mental Status/Behavioral Management	8	23
Medical Management	32	31
Pain Management	2	21
Risk Management	18	35

Table 13. Nonmedical Care Management with or without ICD 9 coded Mental Disease Diagnosis

Care Management Process	**Mental Disease**		**Non Mental Disease**			
	Mean	Standard Deviation	Mean	Standard Deviation	t	p
Bowel & Bladder	0.335	0.258	0.258	0.245	1.22	0.226
End of Life	0.513	0.221	0.561	0.150	-1.02	0.311
Function	0.466	0.145	0.437	0.174	0.70	0.484
Behavioral	0.651	0.208	0.585	0.189	1.33	0.190
Pain	0.453	0.148	0.468	0.180	-0.35	0.725
Risk	0.456	0.145	0.437	0.174	0.70	0.484

Part 3

Aim #2.3. Information transfer at the clinical concept level

#2.3.1: Describe the pattern of information transfer at the clinical concept level

Figures 8 - 18 present information availability by individual information elements within care management processes. Measures of quality of information transferred are designated as information gap, information availability, and information redundancy. Gaps are defined as zero information items found in the documents, availability as one or two information elements and redundancy as three or more information elements from multiple documents.

Figure 8 describes the presence of bowel and bladder information elements and the availability of information which would be fully expected. The results points to multiple information gaps. Special conditions such as diarrhea, ostomy and catheter information vary by patient condition. Catheters were present in 37% of the cases but correspondingly insertion dates were present only 8% of the time.

End of life support (Figure 9) is comprised of administrative information such as healthcare decision makers, their contact information, advance directives and living wills which are legal processes requiring patient decision making. DNR/DNI status is most likely determined with a patients' physician and was missing in about a third of the cases while advance directives and living wills were missing 90% of the time.

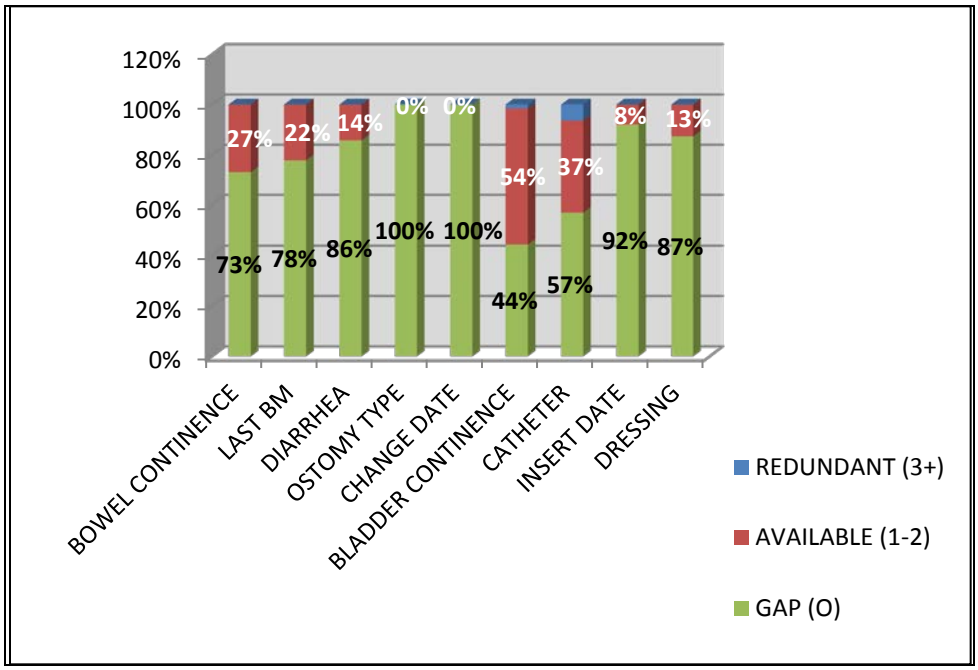


Figure 8. Bowel and Bladder Management

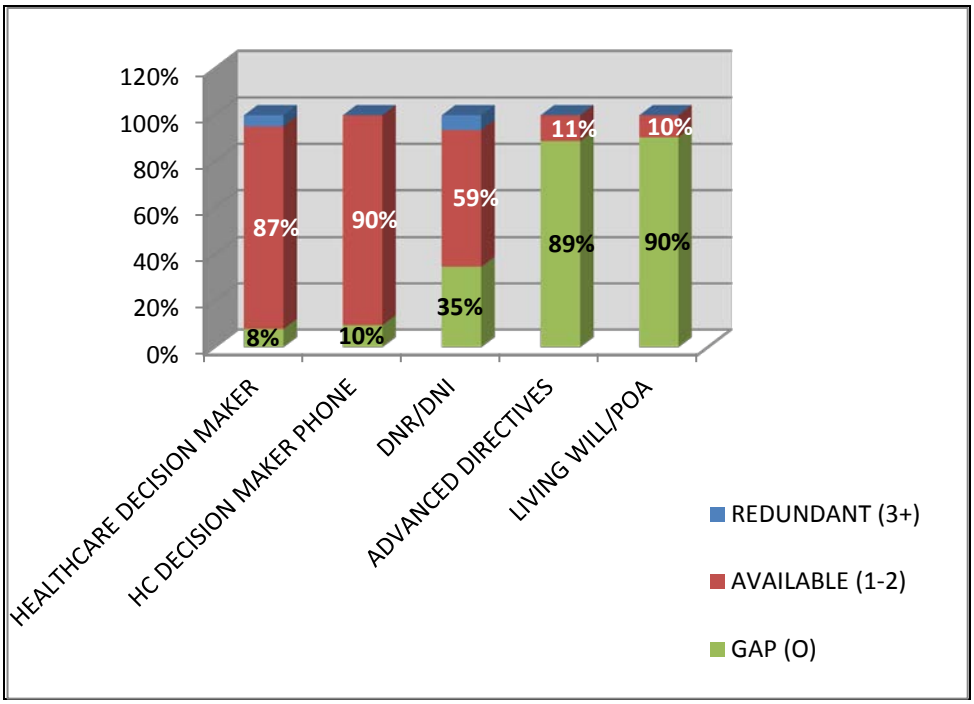


Figure 9. End of Life Support

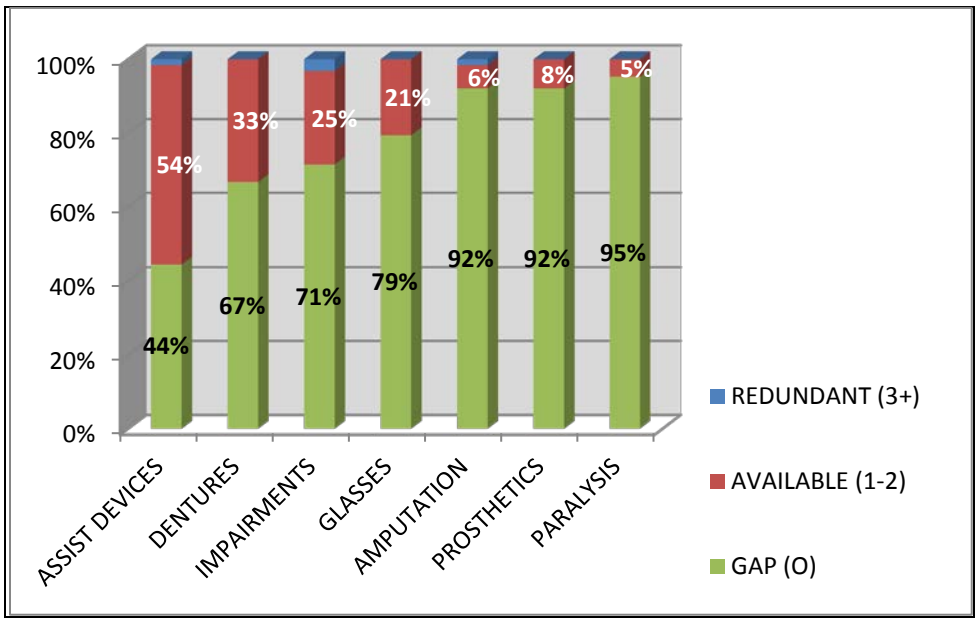


Figure 10.Function Restoration – Special Conditions and Appliances

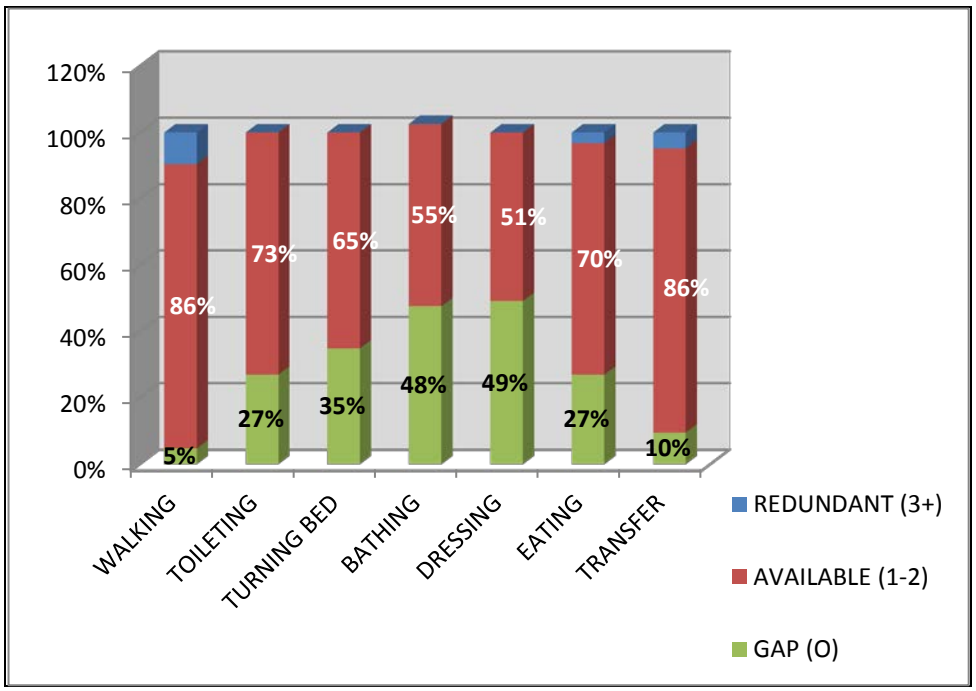


Figure 11. Function Restoration – ADLs

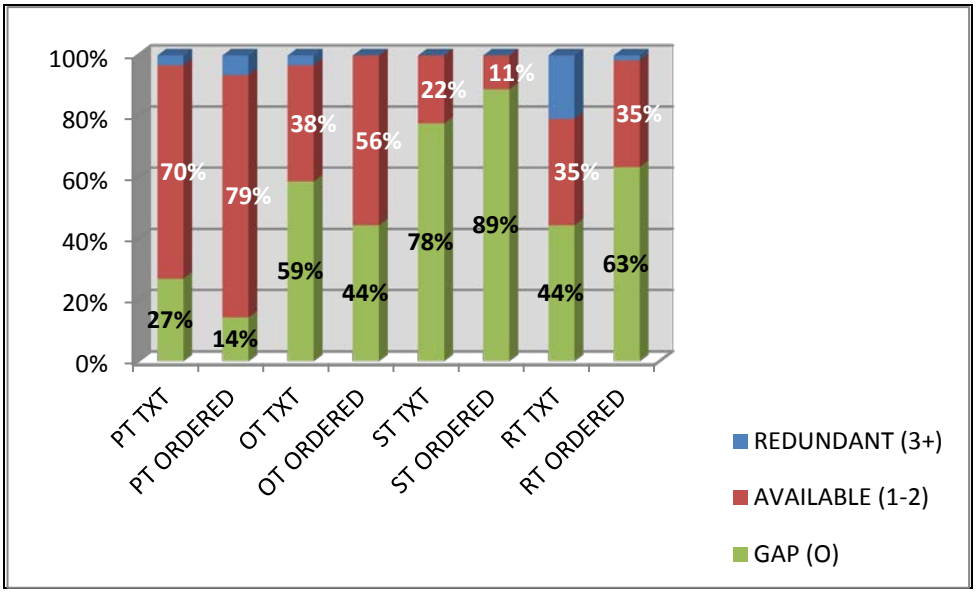


Figure 12. Function Restoration – Therapies

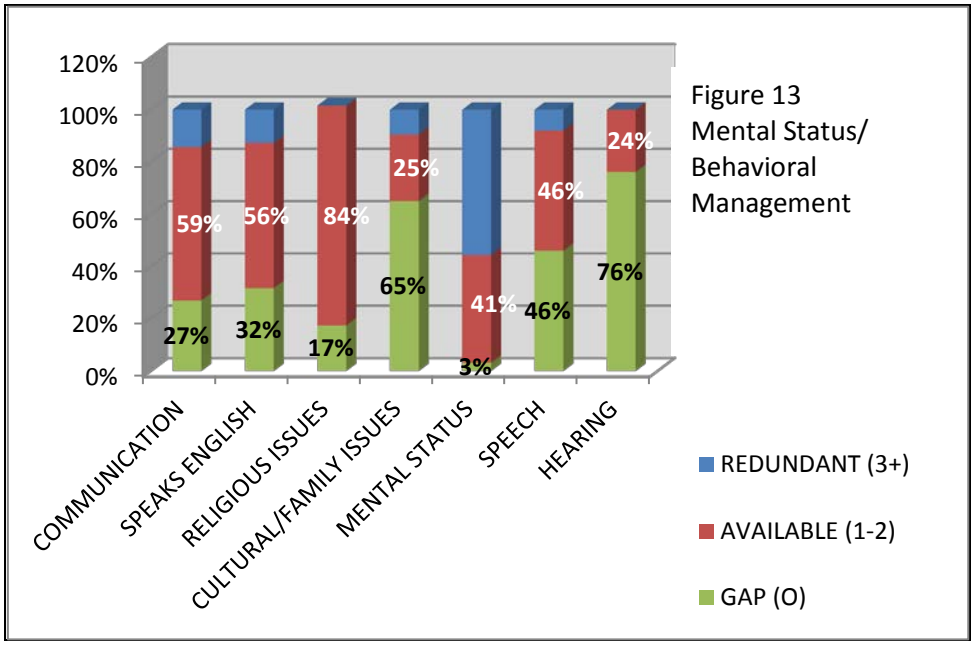


Figure 13. Mental Status or Behavior Management

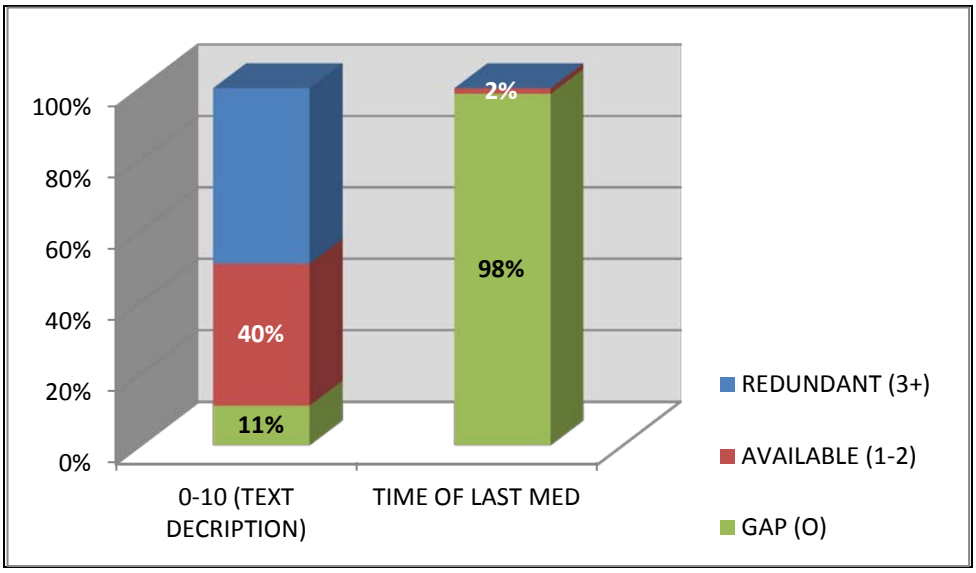


Figure 14.Pain Management

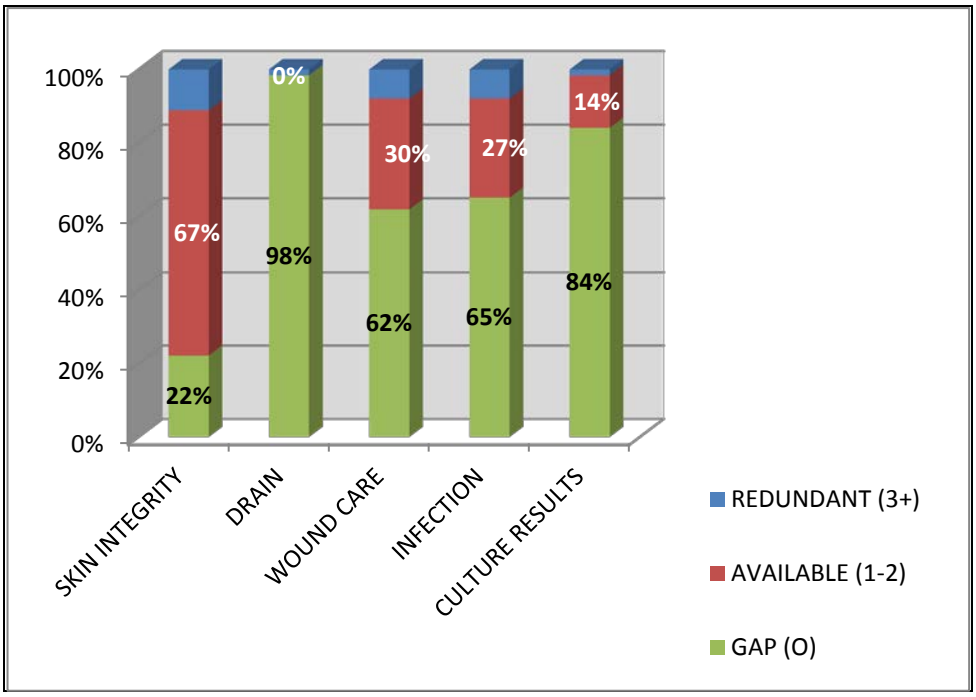


Figure 15. Risk Management – Skin Integrity and Infection Control

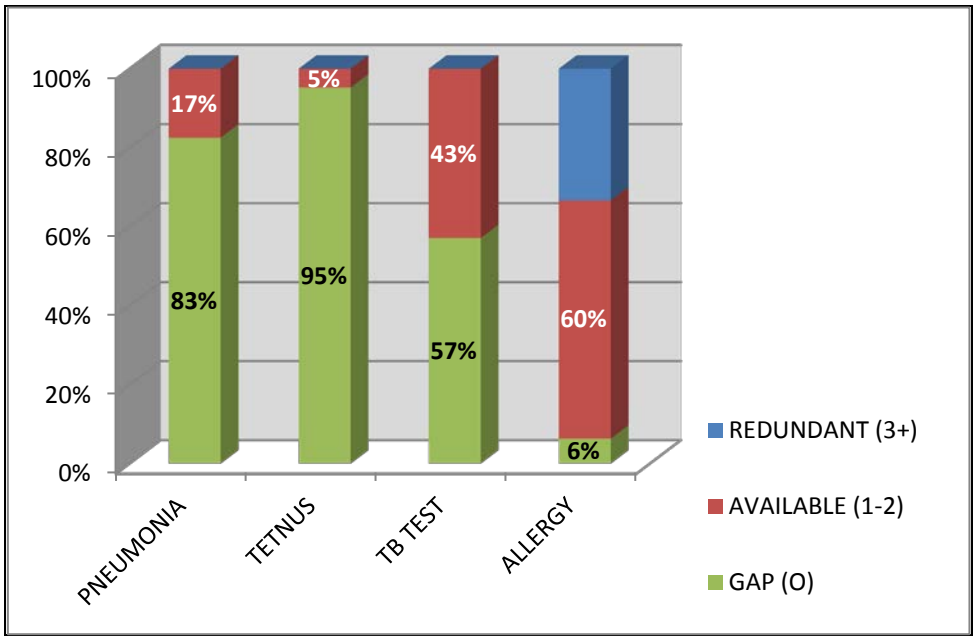


Figure 16. Risk Management – Preventive Measures

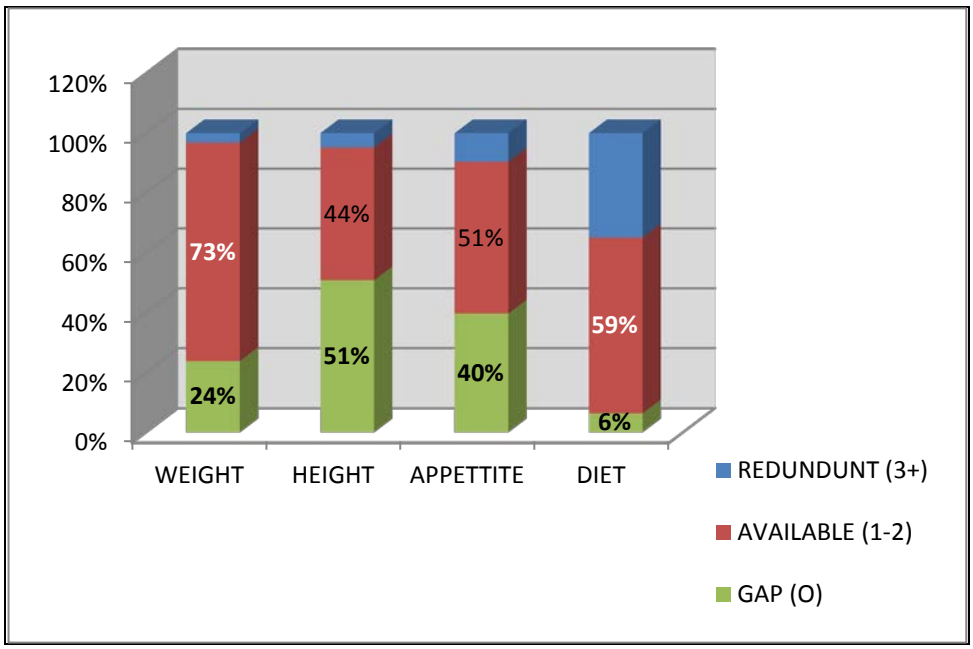


Figure 17. Risk Management – Nutrition

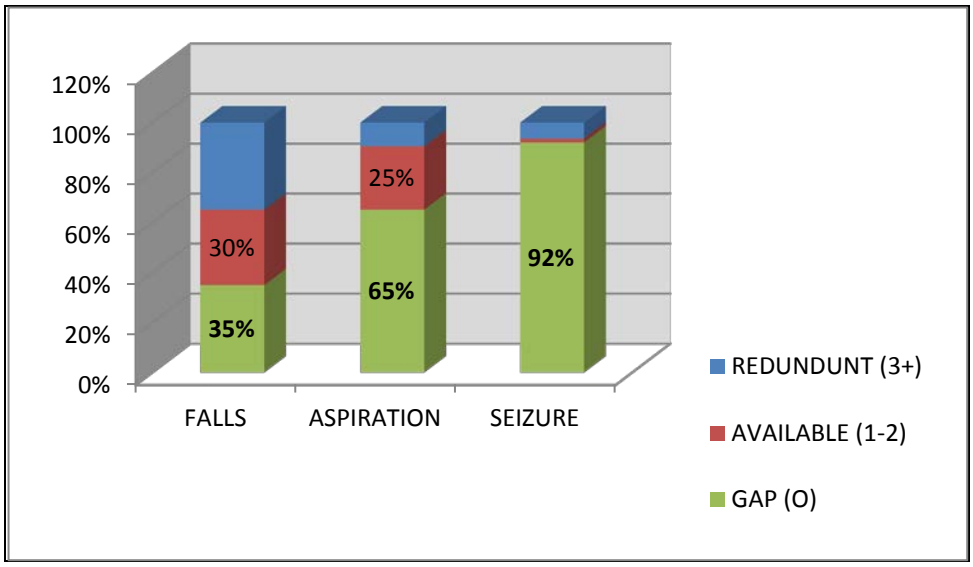


Figure 18. Risk Management – Monitoring

Function restoration includes information elements such as special conditions and appliances, activities of daily living and therapies (both received in the hospital and ordered in the skilled nursing facility). Gaps in information related to the use of glasses, hearing aids, dentures and assistive devices was quite common. Information on conditions such as amputation or paralysis was absent as well but likely impacted by the actual condition of the patient (see Figure 10).Activities of daily living (ADLs) are indicators of function in the elderly are found in Figure 11. Information availability was greater than 50% in all information elements in the sample. Inconsistencies were discovered in the relationship between treatments received in hospitals and treatment ordered in skilled nursing facilities.

For example in Figure 12, information gaps in physical and occupational therapies received were greater than in therapies ordered and may reflect either decreasing needs for services or an actual information gap. Information

documentation in speech and respiratory therapies received were less than therapies ordered.

A key concern from Study 1 was mental status and behavior management. Information elements include capacities to communicate, family and cultural issues as well as cognitions concerns. Withholding information expressed by skilled nursing facilities varied by information element. Religious affiliation was the information most available. The capacity to communicate was available close to 60% of the time and the mental status less than 50% (see Figure 13).

The LINC form captured pain management as two information elements. The elements are a quantitative measure of pain (0-10) and the last time administration of pain medication. A measure of pain (0-10) was often found in a physical or occupational therapy or progress report. Text descriptions of pain were found in multiple places and multiple documents making availability and redundancy quite high. Administration time of the last pain medication is on the other hand a large information gap of 98% (Figure 14).

Risk management information is comprised of several components consisting of: a) skin integrity and infection control; b) preventive measures; c) nutrition; and d) monitoring. Information availability is strongest for skin integrity (see Figure 15). Information gaps were found in infection control information. Lack of information may reflect that either the information or condition was not present in the patient. Current data collection does not distinguish between these two.

A second component of risk management is the information gaps in immunization information. The presence of allergies was well documented (see Figure 16). The third component of risk management is the nutritional status of the patient (Figure 17). Type of diet information was available in close to 60% of the cases. Information gaps in weight, height and appetite were present 51% or less of the time. The ability to calculate Body Mass Index (BMI) is impacted by availability of weight (73%) and height (51%).

A final component of risk management is risk monitoring for falls, aspirations, and seizure (Figure 18). Availability of information related to the risk of falls was the most prominent while aspiration and seizures were characterized as information gaps.

#2.3.2: Assess the quality of information transfer at the clinical concept level between patients with and without ICD9 coded mental disease diagnoses

The proportion of clinical concepts transferred for each care management process was calculated as an indicator for the quality of information transfer. Mean differences were calculated using ANOVA (Table 14). Significant differences were found in greater monitoring for those with ICD 9 coded mental disease diagnoses ($F = 3.13$; $p = .08$).

Table 14. Care Management for those with (MD) or without (NMD) ICD9 coded Mental Disease Diagnosis

Care Process	Statistic	Mean	Standard Deviation	p value
Bowel/ Bladder	F = 0.33	MD = 0.21 NMD= 0.19	0.15 0.15	0.56
End of Life	F = 0.79	MD = 0.50 NMD= 0.54	0.22 0.14	0.37
Function Restoration				
ADLs	F = 0.00	MD = 0.71 NMD= 0.71	0.24 0.31	0.94
Conditions	F = 0.19	MD = 0.17 NMD= 0.16	0.12 0.14	0.66
Therapies	F = 0.75	MD = 0.50 NMD= 0.45	0.23 0.28	0.38
Mental Status/ Behavioral	F = 1.63	MD = 0.57 NMD= 0.52	0.19 0.17	0.20
Pain Management				
Intensity	F = 0.00	MD = 0.91 NMD=0.90	0.30 0.30	0.96
Med Timing	F = 1.03	MD = 0.00 NMD= 0.03	0.00	0.31
Risk Management				
Infect/Skin	F = 0.18	MD = 0.34 NMD= 0.32	0.19 0.20	0.67
Monitoring	F = 3.13	MD = 0.45 NMD= 0.31	0.32 0.28	0.08*
Nutrition	F = 0.46	MD = 0.64 NMD= 0.69	0.28 0.27	0.50
Preventive	F = 0.82	MD = 0.42 NMD= 0.39	0.17 0.13	0.36

* p ≤ .10, ** p ≤ .05, *** p ≤ .01

Part 4

Aim #2.4. Impact of information transfer on patient outcomes

#2.4.1: Assess the relationship between information transfer and positive and negative patient outcomes at the levels of:
a) ICD9 coded mental disease diagnosis;
b) Documents;
c) Care management

ICD 9 Coded mental disease diagnosis. Table 15 demonstrates no significant differences between those with mental disease and those without in terms of the individual 90-day outcomes listed below.

Document level. The presence or absence of individual document types by patient outcome was analyzed as a proportion. Document types included History and Physicals (HP), Discharge Summaries (DS), Nursing Assessments (NA), Occupational Therapy (OT), Nutrition (Nutr), and Advance Directives (AdvDir) as a minimum document set. Fisher exact statistical analyses were conducted to determine significant differences and the results are presented in Table 16. Significant differences were found in those discharged to Assisted Living or Home. The presence of a Discharge Summary ($\chi^2 = 4.07$; $p = 0.04$) and an Occupational Therapy Evaluation ($\chi^2 = 5.36$; $p = 0.02$) were significant at $p = 0.05$ within this outcome group. Outcomes were aggregated into positive and negative outcomes to accommodate the small sample size. ER, Death and Re-Hospitalization were grouped together as negative outcomes versus those who remained in the nursing home or were discharged to assisted living or home (positive outcomes). Table 17 presents the comparisons.

Care management. Similar to the analysis comparing those with ICD9 coded mental disease diagnosis and those without a quality measure was created for each care management process by calculating the proportion of clinical concepts transferred. Two outcome groups were created by combining the neutral/positive outcomes (nursing home, assisted living, and home) into one group and patients experiencing the negative outcomes (death, ER, and re-hospitalization) into the second group. Mean differences within care management process categories were compared using ANOVA to determine significance (Table 18).Significant differences in favor of those with positive outcomes were found in function restoration, specifically ADLs ($F= 11.97$; $p = 0.001$) and conditions ($F = 0.19$; $p = 0.04$) as well as nutrition ($F = 3.03$; $p = 0.08$). Information availability was significant for those with negative outcomes in skin integrity and infection control ($F = 3.15$; $p = 0.08$).

Conclusions

The perception on the part of the Nursing Home staff that information is being withheld or not communicated by the inpatient hospital staff was not validated by this study, at least at the level of documents. Hospitals are indeed sending out multiple information documents including ICD-9-CM codes of mental disease. The perception of not getting “what is needed” by nursing home professionals may actually reflect the reality that the information they are getting requires considerable time and work to decipher, transfer and organize into a care plan. This translation and puzzle completion process adds multiple challenges to the care of the patient. Additional time to secure the necessary

Table 15. Differences in Outcomes with (MD) or without (NMD) ICD9 coded Mental Disease Diagnoses

Variable	Total Sample	# MD	# NMD	Fisher Exact	p value
Death	6%	3	1	1.00	0.32
ER/Hosp	16%	5	5	0.00	0.65
Nursing Home	9%	3	3	0.00	0.68
Assisted Living or Home	68%	21	22	0.21	0.43

* p ≤ .10, ** p ≤ .05, *** p ≤ .01 ER - Emergency Room Hosp - Hospital

Table 16.Document Presence and Outcome

Comparison	Document	Fisher Exact	p value
Death (4) vs non death (59)	HP	0.37	0.71
	DS	2.63	0.10
	NA	0.90	0.45
	OT	1.91	0.21
	Nutr	1.84	0.23
	AdvDir	0.29	0.76
ER or Hosp (10) vs Non ER orHosp (53)	HP	0.07	0.82
	DS	1.65	0.18
	NA	0.05	0.76
	OT	0.42	0.85
	Nutr	0.00	0.65
	AdvDir	3.73	0.11
Nursing Home (6) vs non NH (57)	HP	0.57	0.59
	DS	0.06	0.58
	NA	0.00	0.72
	OT	2.96	0.11
	Nutr	0.03	0.75
	AdvDir	0.45	0.66
Assisted Living or Home (43) vs non AL or Home (20)	HP	0.35	0.48
	DS	4.07	0.04**
	NA	0.12	0.51
	OT	5.36	0.02**
	Nutr	0.37	0.38
	AdvDir	0.66	0.90

History and Physicals (HP) Discharge Summaries (DS) Nursing Assessments (NA) Occupational Therapy (OT) Nutrition (Nutr) Advance Directives (AdvDir) Assisted Living (AL) Emergency Room (ER) Hospital (Hosp) Nursing Home (NH)* p ≤ .10, ** p ≤ .05, *** p ≤ .001

Table 17. Comparison of key document transfer counts by outcomes at 90 days

Document Types	Death/ER/Hosp	NH/LA/Home	Fisher	p value
History and Physicals	13	45	0.02	0.69
Discharge Summaries	2	22	4.33	0.03**
Nursing Assessments	2	9	0.13	0.54
OT Evaluations	5	9	1.90	0.96
Nutritional Note	3	16	0.65	0.33
Advance Directives	2	2	1.91	0.21

* p ≤ .10, ** p ≤ .05, *** p ≤ .01

Table 18. Clinical concept for positive (PFO) and negative outcomes (NFO)

Care Process	Statistic	Means	SD	p-value
Bowel/Bladder	F =0.25	NFO = 0.22	0.12	0.62
		PFO = 0.20	0.16	
End of Life	F = 1.01	NFO = 0.57	0.10	0.31
		PFO = 0.51	0.20	
Function Restoration				
ADLs	F =11.97	NFO = 0.51	0.28	0.001***
		PFO = 0.77	0.24	
Conditions	F = 0.19	NFO = 0.11	0.08	0.04**
		PFO = 0.19	0.14	
Therapies	F = 0.04	NFO = 0.46	0.23	0.84
		PFO = 0.48	0.26	
Mental/Behavior	F =0.00	NFO = 0.54	0.15	0.98
		PFO = 0.54	0.19	
Pain Management				
Intensity	F = 0.11	NFO = 0.90	0.27	0.73
		PFO = 0.90	0.31	
Med Timing	F = 0.28	NFO = 0.00	0.00	0.59
		PFO = 0.00	0.14	
Risk Management				
Infect/Skin	F = 3.15	NFO = 0.41	0.20	0.08*
		PFO = 0.31	0.19	
Monitoring	F = 0.00	NFO = 0.38	0.32	1.00
		PFO = 0.38	0.31	
Nutrition	F = 3.03	NFO = 0.56	0.21	0.08*
		PFO = 0.70	0.28	
Preventive	F = 0.69	NFO = 0.37	0.13	0.40
		PFO = 0.41	0.16	

* p ≤ 0.10, ** p ≤ 0.05, *** p ≤ 0.01

information, clinical expertise to determine the gaps and overlaps, and integration of the information into a “continuity of care” plan uses the precious resources of time, expertise, and critical thinking. Deciphering relevant documents into a care plan requires that the documents be accessible, legible, organized, timely, relevant, and chronological in order to give both a past, present, and future perspective. Such experiences are illustrative of the need for clinician cognitive support recently described in the National Research Council report on Computational Technology for Effective Healthcare(114).

Three significant patterns were discovered. The first was related to discharge summaries (considered a gold standard of information transfer). Although there were significant differences between groups, discharge summaries were present in only about a third of the cases. On average, 8.9 documents per patient were transferred to the nursing home indicating that information in the form of hard copy is coming from the hospital to the nursing home. Whether that information is indeed congruent with previous telephone conversations between transfer contacts was not studied. Whether discrepancies exist between what was verbally transferred and what documents actually are transferred is a question for future study.

A second finding was that nursing documents were particularly sparse (6%) as a proportion of all documents, although they generally represent a large proportion of documents in the inpatient setting. Nursing information at the time of the study may have been limited to hand-written and therefore would be difficult to read, and subsequently not transferred. Standardized or electronic

nursing assessments may not have been available from the sending facility during the study period. In some of the later cases, nursing assessments were included and provided.

Finally, it was difficult to determine when and how often social work assessments should be represented in the document sets. Fifty percent of the cases had mental disease diagnoses and 4 out of the 63 cases died within the first 30 days of the transfer. Given this pattern it could be projected that at least 36 cases (57%) would have a social work note of some relevance. In reality, only 9 cases (25%) had a social work note of any type.

In summary, the proportion of discharge summaries (30%), nursing assessments (6%), and social work evaluations (25%) provide evidence for incompleteness and inaccessibility of relevant information contained in the transfer document set. Administrative documents, physician orders, and history and physicals were present in more than 90% of the patients' records. As a result of this study, it is concluded that document transfer across the continuum of care is inconsistent, incomplete, and highly variable. Standardizing a common set of transferred documents could greatly improve information transfer

CHAPTER 5

STUDY 3: SEMANTIC INTEROPERABILITY ISSUES BETWEEN INSTITUTIONS AND ACROSS THE CONTINUUM OF CARE

Interoperability is fundamental to seamless information exchange and is more than simply retrieving information from one system and faxing a text version of the information. Study 3 aims to demonstrate the interoperability challenges associated with information mapping across the continuum.

Research Aims

Interoperability

Aims #3.1

#3.1.1: Describe the challenges to interoperability across the continuum of care using individual case examples of information transfer at the level of:
a) Administrative data;
b) Pain management;
c) Clinical concept of walking

#3.1.2: Conduct a gap analysis of the LINC form as a solution to information transfer at the semantic interoperability levels 0, 1, 2, and 3.

#3.1.3: Examine the LINC form as a foundation for Detailed Clinical Models.

Methodology

Design

Three examples were chosen to illustrate the challenges to interoperability across the continuum of care. The first example relates to the simple transfer of administrative data and the challenges associated with interoperability between hospitals and nursing homes. The second example examines information elements required by the LINC form for pain management. The third example drills deeper into the complexity of information transfer as it relates to the care management category of function restoration and the clinical concept of walking. The LINC form is then examined from the perspective of interoperability and its possible contributions to the development of Detailed Clinical Models.

Setting

The sources of information used to illustrate the challenges associated with mapping information include the: 1) LINC form organized by care management process; 2) American Society for Testing and Materials (ASTM) Continuity of Care Record (CCR) structure standards; 3) CERNER power chart (EHR) currently deployed at the University of Utah Medical Center; 4) Minimum Data Set (MDS) used by long term care; and 5) LOINC or SNOMED vocabulary standards mapped to the MDS.

Procedures

The information required by the LINC form for each of the three examples were identified and then searched for using the five sources previously identified. The form of the information as well as the source of the information was recorded

from the HER use case. Matching was defined as no match if there was nothing equivalent to the information element (indicated by grey in the cells in each table), partial if there was partial matching, and exact if the data elements from the LINC form were the same as in the EHR. The information element was mapped to the skilled nursing home MDS which had previously been mapped to specific LOINC or SNOMED code. The ASTM CCR structure standard for communication was integrated into the mapping as well.

Findings

Interoperability

Aim #3.1.

#3.1.1: Describe the challenges to interoperability across the continuum of care using individual examples of information transfer at the level of:
a) Administrative information;
b) Care management;
c) Clinical concepts.

Administrative information. Administrative information has received the most focus in terms of standardization as a result of the need for billing and financial management. Table 19 provides an overview of the institutional transfer data required by the LINC form delineating the inter-facility transfer administrative information. These elements are then mapped across the continuum using the aforementioned standards. For example, the term ICF/MR (Intermediate Care Facility/Mental Retardation) requested as an option on the LINC form is mapped to both the CERNER Power Chart use case and the MDS but does not have a corresponding match to the LOINC or SNOMED codes (115). LTCH (Long Term

Table 19. Institutional Transfer Information

LINC Struct Category	LINC Data Element	CCR Attributes and data objects	UU Use Case - CERNER	CERNER Match	MDS Ver 3.0	LOINC/ SNOMED CT CODE
Transfer to and from	Hospital	<To><Actorlink> (Actor ID><ActorRole>)	Nursing Discharge Summary	Partial Match	AB2.5	45410-8
	SNF	<To><Actorlink> (Actor ID><ActorRole>)	Nursing Discharge Summary	Partial Match	AB24	45410-8
	ICF/MR	<To><Actorlink> (Actor ID><ActorRole>)	Nursing Discharge Summary	Exact Match	AB26	
	Swing Bed	<To><Actorlink> (Actor ID><ActorRole>)	Nursing Discharge Summary	Exact Match		
	RCF/ALF	<To><Actorlink> (Actor ID><ActorRole>)			AB27/AB23	45410-8,45410-8
	LTCH	<To><Actorlink> (Actor ID><ActorRole>)	Nursing Discharge Summary	Partial Match		

Care Hospital) had no match in MDS while RCF or ALF (Rehabilitation Care Facility or Assisted Living Facility) had no match in the CERNER Power Chart but did with the MDS LOINC or SNOMED codes.

Seamless interoperability for purposes of administrative patient information transfer would require the application of several standards with differing capacities. Table 20 presents the mappings of administrative data across the selected standards and sources. Patient date of birth is universally matched across standards and continuum. Facility contact information matching varied across data standards and sources but could be managed structurally with the CCR standards.

The LINC form request for contact information requires a contact name, title, phone and fax number. The source of that information was found in the EHR hospital case management document or interdisciplinary plan or was located in the metadata of the CERNER Power Chart. No codes were matched in either the MDS or corresponding LOINC and SNOMED codes. Facility contact relevant to a specific patient would be highly variable due to the changing nature of the environment and changing healthcare professionals

Care management. The LINC form identified the two pain information elements of a measure of pain (0-10) and the time of the last administration of pain medication. The need for this information is for care management and not for diagnosis or treatment. Pain-relevant information fragments were found across 21 documents in the chart reviews. Pain management has multiple dimensions and can be classified as a symptom of a disease, as a response to a

Table 20. Patient Identification Data and Facility Contact Information

LINC Struct Category	LINC Data Element	CCR Attributes and data objects	UU Use Case - CERNER	CERNER Match	MDS Ver. 3.0	LOINC/ SNOMED CT CODE
Patient Name	Name	<Patient> linked to <Actor> found in Footer through <ActorID>	Adult Admission Power Form	Partial Match	AA1a,AA1b, AA1c	45392-8,45393-6,45394-4
Date of Birth	Date	<Actor><ActorObjectID>DateOfBirth><ExactDateTime>	Patient Demographic Tab	Exact Match	AA3	21112-8
MRN#	Number	<Actor><ActorObjectID><IDs>	Meta data	Specific to facility	AA5a, AA5b, AA7/A6	45396-9, 45397-7, 45400-9
Facility Name	Name	<Actor><Organization>	Meta data	Specific to facility	AA8	
Patient Care Unit	Name	<Actor><Organization>	Meta data	Specific to facility		
Contact	Last, First	<Actor><ActorID>	Meta data	Specific to facility		
	Title	<Providers><Actor><ActorRole>	Case Management Note, Interdisciplinary Care Plan	Specific to facility		
Unit phone	Number	<Actor><Organization><Telephone>	Case Management Note, Interdisciplinary Care Plan	Specific to facility		
Fax #	Number	<Actor><Organization><Telephone>	Case Management Note, Interdisciplinary Care Plan	Specific to facility		

procedure, as a measurement of recovery or exertion, as an indicator for medication relief or as a symptom of addiction. Additionally pain can take the form of text, a subjective quantitative measure (0-10), a medication dosage, or even a visual icon of a happy or sad face.

The LINC form asks for a measurement of pain using the 0-10 scale upon transfer. The ASTM CCR can treat this information element as a "problem" capturing the data as text. An actual measurement of 0-10 was not found in the CENER Power Chart as an option but qualitative text descriptions of pain was described as none, acute, chronic, intermittent, sharp, and dull. The MDS defines pain in terms of frequency of occurrence with options of no pain, pain less than daily, pain daily, and intensity of pain. Semantic representation of pain varies depending on the standard being used and complicates its electronic capture. Another challenge lies in the fact that the same LOINC code (45710-1) is mapped to multiple representations of the MDS codes (J2 Pain symptoms and J2a, J2a0, J2a1, J2a2, and J2a3). Additionally there are two SNOMED codes used to represent pain(301379001)and are mapped to the MDS J2 and one code (267104002) is mapped to multiple MDS representations (J2a, J2a0,J2a1, J2a2, and J2a3). Such code mapping confusion complicates both the interpretation and the interoperability.

The mixture of 1 to 1; 1 to many; and many to 1 terminology mappings creates multiple complexities across the continuum in the effort to create interoperability around pain management. Contextual understanding and sources of information in the hard copy document analysis adds even more

complexity. Pain was often described in the history & physical as a complaint or presenting symptom and was presented as a textual description. A measurement of 0-10 was most frequently found in a physical therapy or occupational therapy evaluation or treatment note. Representation of pain in a nursing assessment form was limited by the pre-determined selections. Pain management as a care management process is reflected in multiple ways including but not limited to pain as a symptom of a disease, as a measure of recovery from an intervention, as an indicator for medication, or as a symptom of addiction. Specific descriptions of the multiple representations of pain can be found in Table 21.

Clinical concepts. Focusing at the level of an individual clinical concept such as walking is challenging as well. The LINC form requests information on walking capacity and uses three qualitative measures (independent, needs help, and not able) to represent the capacity. The CERNER Power Chart uses four qualitative metrics to describe walking capacity which include:1) activity assistance, 2) activity status, 3) ambulation distance, and 4) ambulatory effort. The MDS on the other hand uses 6 categories of walking which relates primarily to the need for assistance: 1) walks in room independently, 2) walks in room with supervision, 3) walks in room with limited assistance, 4) walks in room with extensive assistance, 5) walks in room totally dependent, and 6) no walking in room occurred during entire 7 day periods. At the same time the LOINC code mapped to the 6 states of walking in the MDS is one code (45592-3), thus representing all types of the need for walking assistance. Table 22 describes the interoperability challenges across the continuum using walking as an example.

Table 21. Pain Management across the Continuum

		PAIN MANAGEMENT						
LINC	**CCR**	**UU Use Case**			**MDS**	**LOINC**	**SNOMED**	**Hard Copy**
Process	***Structure***	***Form***	***Format***	***Language***	***Text***	***Code***	***Code***	***Documents***
NONE	""	Adult Admission PF, Adult Assessment PF, Pain Assessment PF	Radio buttons, text	Patient denies pain				Extended Care Facility Physician Order and Nursing Care Referral Form
ACUTE	""	Adult Admission PF, Adult Assessment PF, Pain Assessment PF	Radio buttons, text, numerical, checkboxes	Adult Admission PF: Are you in pain now (radio button), If yes, indicate level (box for numerical entry), Describe the pain: /Adult Assessment/Pain Assessment PF-Time of onset: acute	J.2.b. Intensity of Pain, J2.b.1. Mild Pain, J2.b.2. Moderate Pain, J.2.b.3. Times when pain is horrible and excruciating, J.w.b.4. UTD	45711-9	40196000, 50415004, 67849003,	History & Physical
CHRONIC	""	, Pain Assessment PF	checkbox, text,	Time Pattern: chronic				Medication Transfer Rewrite Order
INTERMITTANT	""	Adult Assessment PF, Pain Assessment PF	Checkbox, text	Time Pattern: intermittent				Nursing Assessment
SHARP	""	Adult Assessment PF, Pain Assessment PF	Checkbox, text	Quality: sharp				Nursing Notes TELEMETRY
DULL	""	Adult Assessment PF, Pain Assessment PF	checkbox, text	Quality: dull				Occupational Therapy Evaluation/ Note

Table 22. Walking Example

LINC Form	Assessment Status	ASTM Continuing Care Record (CCR)	UU Use Case - CERNER	Form	Content	MDS Ver 3.0	LOINC SNO-MED	Code
Walk	Independent	<Function><CCRDataObjectID><Type><Problem><Description><Status><Source>	Partial Match	ADL's Power Form	Activity Assistance: Independent: Activity Status: ambulating in hall, ambulating in room; Ambulation distance _ft; Ambulatory effort: good, fair, poor, other.	G1.c.A.0. Walks in room independently	LOINC	45592-3
Walk	Needs help	<Function><CCRDataObjectID><Type><Problem><Description><Status><Source>	Partial Match	ADL's Power Form	Activity Assistance: minimum assistance, moderate assistance, standby assistance, one person assistance, Assistive Device: none, brace, cane, crutches, gait belt, prosthesis upper extremity, prosthesis lower extremity	G1.c.A.1. Walks in room w/ supervision	LOINC	45592-3
Walk	Needs help	Repeat	Partial Match	ADL's Power Form	Repeat	G1.c.A.2. Walks in room w/ limited assistance	LOINC	45592-3
Walk	Needs help	Repeat	Partial Match	ADL's Power Form	Repeat	G1.c.A.3Walks in room w/ ext assistance	LOINC	45592-3
Walk	Needs help	Repeat	Partial Match	ADL's Power Form	Repeat	G1.c.A.4Walk in room totally dependent	LOINC	45592-3
Walk	Not able	Repeat	Partial Match	ADL's Power Form	Repeat	G1.c.A.8Nowalking in room occurred during entire 7-day period	LOINC	45592-3

#3.1.2: Conduct a gap analysis of the LINC form as a solution to information transfer at the semantic interoperability levels 0, 1, 2, and 3

Level 0: Hard copy and faxed documents. The LINC document is currently available in a PDF format and is being deployed in Utah as a form to be completed manually by discharge planners, care managers, long term care nurses and other direct service providers upon transfer of a geriatric patient either from or to a care facility. A preliminary assessment of the time and cost to complete such a document for each transfer nationwide yielded (15 to 30 minutes a transfer form) an estimated $32-$64 million a year (116). While it is acknowledged that access to such a summary of patient information would aid in the care management of the patient by increasing control, communication, and information exchange; the question of "at what cost" is raised. *:*

Utah is proceeding with the deployment efforts but not without some resistance from healthcare representatives as they recognize the cost in terms of time to complete the document. Some facilities (Intermountain Healthcare (IHC) and Avalon Nursing Group) are exploring capturing the needed data from their electronic health record, formatting the information into a text based document and electronically faxing the information to the receiving entity. Such an example can be found in Appendix D.

Components of the electronic medical record have been identified that map to the requested information in the LINC form. In one test run with IHC, the components which were pulled from the electronic medical record included: 1) case management 72 hours rounds report; 2) medication list including schedules,

date/time due, order date, and last given; 3) stool information; 4) lab data; 5) problem/evaluation documentation; 6) history and physical; 7) physical therapy report; and 8) general patient admission information including contact information. The consolidation of this information into a transfer document resulted in an 8 page faxed format. Such an approach meets the simplest level of interoperability, level 0 and results in hard copy or faxed documents filed into a hard copy chart. At this level of interoperability, reuse or integration of the information transferred cannot be achieved.

Level 1: Technical and syntactical interoperability. Technical and syntactical interoperability requires the use of structured messaging formats and coded data. The LINC form in its current rendition has been designed for manual completion. No document structure or terminologies have been identified or recommended. A meeting was held August 30, 2011 with the developers and representatives from the Utah Health Information Network to discuss appropriate standards. A recommended solution to be incorporated is the use of the HL7 Continuity of Care Document (CCD) standards. Once the document is structured according to those standards, a human readable and computer readable transfer of the document could be sent across the continuum resulting in Level 1 interoperability.

A mapping of the LINC form in compliance with the CCD standards is presented in Table 23. LINC items not compliant with the CCD standards include the visual drawing for skin integrity, whether or not devices (hearing aids, eye

Table 23. Mapping of LINC information elements using CCD Standards

CCD structural components	**CCD Definitions**	**LINC Data Elements**
Header Purpose	The reason summary was produced	Linking Information Necessary for Care Transitioning TO/From
Problems	Known clinical problems - current and historical identified as Observations in CDA R2	Reason for transfer Skin integrity Pain Assessment Infection Bowel Bladder Appetite/Nutrition Skin breakdowns Aspirations Seizures Isolation Wander/elope Fall risk
Procedures	Historical procedures or treatments (1 year)	Treatments received in last 14 days Chemotherapy Radiation Oxygen Tracheotomy Ventilator Transfusion Dialysis Isolation/Infection BiPAP/CPAP Hospice Care Suctioning None Treatments Physical Therapy Occupational Therapy Speech Therapy
Family History	Health risk factors related to genetic relatives	
Social History	Administrative data, personal or occupational information, health risk factors, emotional, psychological, physical wellbeing	Name of Healthcare decision maker Religious/Cultural/Literacy/Other Issues
Payers	Financial parties responsible for patient's care	
Advanced Directives	Life with dignity, POLST, DRN, DNI	Advanced Directives
Alerts	Alerts, adverse reactions, and allergies	Allergies
Medications	Current and relevant med history identified by Event mood or Intent mood - orders contained in plan of care section (15 mo previous)	IV Pain Medication - last administration and next dosage

Table 23. Continued

CCD structural components	**CCD Definitions**	**LINC Data Elements**
Immunizations	History and current immunization status	Most recent immunizations
Medical Equipment	Medical devices and equipment (external and internal)	Assisted Devices
Vital Signs	Historical, pertinent, and current vital signs (1 year or maximum of 10 most recent)	Current Vitals
Functional Status a) Problem - pertinent clinical condition, diagnosis, symptom or finding b) Result - Analysis or determination resulting from clinical assessment; c) Text	Described at the point care record was created: 1) Ambulatory capacity; 2) Mental condition or competency; 3) Ability to care for self; 4) ADLs; 5) Home living situation; 6) Communication ability; 7) Perception; 8) Social activity; 9) Occupational activity;	Ability to communicate Speaks English Mental Status/impairments Fall History Hearing Vision Sensation Amputation Contractures Paralysis ADLs Walking Toileting Turning Bathing Dressing Eating Transferring
Results	Comprises observational results produced by laboratories, imaging, other procedures	
Encounters	Previous healthcare encounters - minimum of 1 year for progress notes, consult notes, discharge summaries (prefer 3-5 yrs)	Admission to other Hospital/LTC facility in past 30 days (reason, date, location)
Plan of Care	Upcoming encounters, orders, services, interventions, procedures.	

glasses, medical devices, etc.) have been sent with patient, how the patient is transported, and who is giving the verbal report. Required documents including face sheets, medication administration records, discharge medication reconciliation record, history and physical, physician orders, nursing assessment, consult reports, physical, occupational or speech therapy evaluations, wound therapy notes, physician progress notes, pertinent laboratory results, and advanced directives will vary in compliance with HL7 standards depending on the maturity of the Electronic Health Record.

Level 2: Partial semantic interoperability. Yun and Kim (2007) make a case for processing HL7-CDA entry for semantic interoperability which would result in partial semantic interoperability (117). They argue that with a syntactic structure such as HL7-CDA standards, semantic interoperability could be achieved. If terminology standards such as LOINC or SNOMED-CT are used to represent individual information elements such as vital signs, immunizations, and medications in addition to the HL7-CCD structure, partial interoperability is possible.

Parker et al, however, point out that this is not so easy (118). Using the example of supine blood pressure they demonstrate how such a measure which appears standard on the surface can be represented in three different forms. These forms include a single precoordinated term (supine systolic blood pressure), precoordination of two concepts (systolic blood pressure qualified by supine) or postcoordinated (supine systolic blood pressure, supine diastolic blood pressure). The LINC form represents blood pressure simply as "Current Vitals:

BP_____". There is no definition of which blood pressure type (supine or standing) or how it should be represented (precoordinated, precoordinated mixed, or postcoordinated). The lack of specificity at the level of terminology and information modeling would prohibit the LINC form from achieving partial semantic interoperability. Passive acceptance of any measure of blood pressure may prove useful but could be unsafe.

Level 3: Full semantic interoperability. The problem of inter-facility transfers is compounded by the contextual environments and the corresponding information infrastructures. As hospitals progress towards electronic medical records, the information that they collect will reflect the crisis stabilization, diagnostic, and treatment initiation information paradigms. Skilled nursing care environment are embedded with recovery, function restoration, and end of life paradigms reflected in the Minimum Data Set (MDS). Hospital biomedical information varies dramatically from skilled nursing care assessment data. Common across all sectors is care management. Using Detailed Clinical Models as a mechanism to represent common care management across the continuum may be an avenue into full semantic interoperability.

#3.1.3: Examine the LINC form as a model for Detailed Clinical Models

The use of a Detailed Clinical Model as a mean of transferring information across the continuum specific to care management is considered as a solution. Components of such a solution include the use of clinical forms and clinical fragments. The LINC form is a grass roots attempt at identifying the necessary clinical fragments needed (86) for ongoing care management. Another example

includes a CMS contract to develop a standardized patient assessment tool called the Continuity Assessment Record and Evaluation (CARE) tool designed to eventually replace OASIS and MDS (119). It is likely that there are other efforts underway not publically known in an attempt to resolve the information transfer problem.

Organizing information transfer into care management processes across the continuum would provide a unifying theme for cross-sector and interdisciplinary participants. Such an approach would help healthcare providers to step outside of their siloed vocabularies and sector roles into the care management continuum. The LINC data request form can serve as an initial attempt to capture clinical information fragments. Identifying relevant terminology standards to function restoration would in theory include standards for physical therapy, speech therapy, and occupational therapy. The latest publication of the U.S. Library of Medicine issues in 2011 indicates there are no such terminology standards to date (120). It appears that allied health services including social work do not currently have standardized vocabularies and any data relevant to those domains would come in the form of text requiring natural language processing. As a result, relevant nursing, function and long term care standards are used and include the North American Nursing Diagnosis Association (NANDA), International Classification of Functioning (ICF), and the Minimum Data Set (MDS).

Table 24. Function Restoration - Walking

LINC Element Element Code	NANDA Element Code	ICF Element Code	MDS Element Code
Independent		Walking (d450)	Walks in room independently (G1.c.A.0)
		short distances (d4500)	Walks in room w/ supervision (G1.c.A.1.)
		long distances (d4501)	
		on different surfaces (d4502)	
		around obstacles (d4503)	
		other specified (d4504)	
		unspecified (d4509)	
Needs Help	DX: Impaired Walking w/(00088)		Walks in room limited assistance (G1.c.A.2.)
	Impaired ability: to climb stairs; to navigate curbs; to walk required distances; to walk on incline; to walk on decline; to walk on even surfaces.		Walks in room w/ assist(G1.c.A.3)
Not Able			Walk in room totally dependent (G1.c.A.4)

Table 24 presents walking from the function restoration care management process as an example to demonstrate the challenge associated with the use of national standards and semantic representation as a foundation to the development of DCMs. Using LINC as a starting point, agreement gained from sector representatives could define walking with a goal of interoperability. However, the individual representation of walking within each standard indicates the use of different information models making mapping across the continuum difficult. The LINC element in its current form is a clinical assessment or observation concerned with the level of dependency of the patient on the need for assistance. The NANDA representation of walking on the other hand treats the concept of walking from the perspective of impairment and treats impairment as a diagnosis. One code represents the diagnosis while the defining characteristics or attributes define mobility within a context outside of a healthcare facility. The ICF representation of walking describes the concept from the perspective of distances walked, surfaces and obstacles avoided or negotiated. Such representations are independent of environment. The MDS representation of walking uses the room (probably referencing the skilled nursing facility room or hospital room) as a context.

Conclusions

The LINC transfer form is a grassroots user-driven attempt to solve a long standing problem of information transfer between sectors and across the continuum of care. The LINC form was used to assess the extent of the availability of the requested information. Analysis reveals that the data is some

instances in not available, is redundantly available but in differing forms or is matched in some instances. There is wide variability across the requested information set in access. Access to administrative data presents limited difficulty. Access to relevant care management information is variable and inconsistent.

The LINC form is currently assessed at a semantic interoperability of zero requiring manual completion. Implementing manual completion by a case manager, discharge planner, or direct care provider for every discharge of those 65 and older from a hospital to a nursing home is not a feasible solution and would cost the healthcare system (15 to 30 minutes a transfer form) an estimated $32-$64 million a year (116). Recognition of this cost has resulted in local push back in the preliminary testing of the LINC form. Mapping the LINC data elements to national standards and beyond local experiences as a possible foundation to the development of Detailed Clinical Models is also a challenge and illustrates the problem of semantic interoperability (86). Relevant allied health (PT, OT, ST and social work) vocabularies standards are not currently available as well.

CHAPTER 6

DISCUSSION

The results of three studies are reported in this dissertation and together they were designed to test the hypothesis that information transfer between healthcare sectors is inadequate and might be related to poor patient outcomes. Moreover, these studies illustrate that medical informatic tools could be used to improve the transfer of healthcare information. A mixed method approach was used which included: 1) qualitative interviews with cross-sector and interdisciplinary healthcare professionals to explore the information transfer experience; 2) a retrospective chart review which examined patterns of information transfer across the inpatient and nursing home continuum; and 3) an examination of semantic interoperability issues between institutions across the continuum of care. Each study built on the findings of the prior study. A summary of the findings is presented below.

Summary of major findings

Qualitative results from Study 1 suggested a lack of timely and complete information transfer – especially related to key management problems of concern to both nursing homes and community care providers. Problems associated with mental health and behavioral difficulties were perceived as being particularly under-reported. These perceptions have been validated in other studies (121).

Information about other management problems also appeared to be missing, such as obesity and/or family and finance issues. Perceptions of mistrust and information withholding were expressed by several receiving entities as they related to the key management issues.

In addition, the skilled nursing providers in particular described the information transfer experience as chaotic, akin to putting a puzzle together but with missing, contradictory, or overlapping information. Because information assimilation, organization, and interpretation is key to actionable knowledge (58, 122), skilled nursing providers reported feeling frustrated in their ability to move quickly to arrange care for new patients.

The second study in this research stream assesses documented information transfer directly through chart review. Results from Study 2 demonstrated that document transfer is inconsistent across document types. Administrative documents, medical orders and history and physicals (H&P) were the most consistently transferred document types and were present in over 90% of the cases. Surprisingly clinical document types were often missing and/or highly variable. Discharge summaries (30%), nursing assessments or notes (17%), and social work documents (25%) were the most problematic. Additionally, advance directives/living will documents necessary for end-of-life support were present in only 6% of the patients. These information gaps are consistent with other research findings (123, 124).

However, contrary to the initial hypothesis, the overall pattern of document transfer did not differ by mental health status. Missing documents were equally

distributed across groups. These results differed from the perceptions articulated in Study 1. One explanation may be related to the differences between what is communicated by phone in the initial search for a placement and what actually gets transferred in the form of documentation (125). Although document transfer was not significantly different between groups, information about behavior and mental status was equally low across groups. Hence, the complaints from nursing homes that they are not getting relevant mental health and behavior management information were supported overall.

Although limited by small sample sizes, those patients with positive outcomes had a higher proportion of discharge summaries compared with those with negative outcomes. These results do not establish a causal link between the lack of discharge summaries and patient outcomes, but they are suggestive of the need for more research in the area. Other work has found low rates of available discharge summaries associated with negative outcomes (126, 127).

Pattern analysis regarding large variability in the availability of "management information" was found again when the information transfer was assessed at the concept level. Information related to care management processes such as bowel and bladder management, end-of-life support, mental status/behavioral management information and some risk management was not transferred consistently. For example, it was common that administrative data (names, addresses, medical records numbers, etc.) were present in several documents. On the other hand, the care management concepts associated with risk management [seizures (7%), aspirations (36%), and infections (34%)

immunization records (3-44%); function restoration (less than 33%); and bowel and bladder management (22 - 55%)] was low and variable.

In a focus group conducted with patients and family caregivers the number one issue identified was information transfer (128). These perceptions were consistent with other literature that showed that transitions in care are fragmented (129, 130). Results from this research demonstrate documentation continues to be fragmented, incomplete, inconsistent and overlapping. Information fragments within care management processes are in fact found across many document types but not constructed or displayed in a coherent care management framework. The lack of a coherent information capture and display across institutions can negatively impact the control of care across the continuum. One explanation may rest in the relative lack of nursing notes in the transfer process. Current literature indicates that there are efforts to develop a nursing discharge summary which may resolve some of the challenges (85, 131,132).

Implications for a Joint Cognitive System

Mapping the findings of this dissertation research onto the Joint Cognitive Systems theoretical model will help facilitate generalizability. Specifically, the JCS themes of *goals, control* and *co-agency* serve as explanatory and organizing principles for identifying clinical information archetypes (i.e., clinical information fragments).

Goals of Care

Identification of the mutual goals of care between provider and patient is critical to a patient-centered medical home model (133) and also a core component for quality of care of older adults (134). However, patients, non-medical staff, and the skilled nursing staff often complain that they lack understanding regarding the goals of care. Goals are not often communicated effectively across disciplines and settings (135). Creating shared awareness regarding mutual goals is a central component of effective communication(136). Enhancing communication regarding goals of care has been shown to decrease cost and improve quality in at least one ICU intervention (137). Additionally, a multidisciplinary approach to transitional care can improve patient safety (111) and streamline process of continuity of care (85).

The goals of care change dramatically when a patient is discharged from the hospital and admitted to a skilled nursing facility. The focus in the skilled nursing facility is on maintaining function and preventing harm. However, information to support these goals is largely missing in the transfer process. From the nursing home perspective, the lack of coherent information exchange in these areas results in significant confusion regarding the goals of care (per qualitative interview results).

A patient-centered approach has positive impacts on individual patient experiences when it includes both the patient's care and organizational transfer trajectories (132). Patient-centered goals can be lost in the clinical textual narratives and not addressed in the abstracted and depersonalized clinical data.

A patient-centered solution would start with the development of cross-sector interdisciplinary goal-mapping across the continuum explicitly defining expected outcomes, time trajectories and deviations. Such a model is currently being tested in a Agency for Healthcare Research and Quality (AHRQ) funded VA-based research project, called Integrated Medication Manager (138, 139). Such an approach to information display of cross-sector goals within care management process could greatly enhance patient outcomes.

Control

Being in control of a process is defined as knowing what *has* happened and what *will* happen. The feedback and feed-forward mechanisms to enhancing control are highly information dependent and are "intrinsically linked" ((3) p. 138). Feedback in this application requires collecting data from past experiences and passing it back to the sending facility. Feed-forward (anticipatory control) requires “on-line” tracking of events which presupposes that clinicians have access to informatics solutions that cross sectors. One such effort (140) has demonstrated an information communicated between systems. Tracking, trending, and managing outcomes are all necessary functions of the joint cognitive system.

Information components for maintaining control of the process include knowledge, competency, and capacity. The knowledge component consists of past, present and future dimensions of the care management information. In care continuity, understanding the phases associated with the transfer process (85) as well as the relevant care management information needs (24) has the potential to greatly enhance patient care outcomes Competency is defined as

the organization of expertise into an actionable framework as well as information about necessary resources. The results of such an approach would efficiently and effectively inform the hand off recipient of the next patient care steps to be taken. An information-based solution which can support the anticipatory control needs of the continuum of care would need to be flexible, real time, and interoperable, thus creating capacities for updates, course corrections, or change monitoring.

Co-agency

The interdependencies and inter-relatedness of sector relationships are both ubiquitous and idiosyncratic. Role definitions have changed from an original social work discharge-planning approach, to a nursing case manager model, and are changing again to hospitalist - primary care communication exchange, to a multidisciplinary team and even more recently a transition coach model for families. And yet, the problem of inadequate information transfer at discharge remains. Each of these "human resource" solutions is reflective of individual sector or disciplinary coping responses to a fragmented system of healthcare delivery and not a formalized Joint Cognitive Systems approach to resolving the challenges. The finding in this study that non-medical documents were more infrequently transferred (e.g., nursing and social work notes), is indicative of a failure to support co-agency.

Implications for Care Management and Information Solutions

The current national focus on the Medical Home is promoted as a method for assuring continuity of care. The deployment of Electronic Health Records throughout hospitals and within primary care is being garnered to lay the infrastructure for this new healthcare delivery model. The findings from this study indicate that the challenges to designing effective informatics support for transitions are substantial. For example, prior work has found that mapping information from the EHR to the MDS is thwarted by semantic factors of content, format, standards, process and communication (23). Methods for transferring functional, management and behavioral information are still in their infancy.

There are several European interoperability solutions that have been discussed and tested in the literature. (107). However, because many of these solutions are derived from a socialized and integrated healthcare context, they may not be exportable to the United States. Goossen (88) calls for the development of a Detailed Clinical Models (DCM). Detailed Clinical Models are defined as information models comprised of discrete and precise clinical knowledge which can be used in a variety of contexts. Goossen's approach (86) would require: "1) formalizing, structuring, or standardizing clinical data elements; 2) modeling the elements independent of technical implementation, and 3) applying them to different technical representations, such as electronic health records, electronic messages, and data warehouses or data repositories" (p. 1). Such an approach is currently in hospital practice locally (89), nationally through

the HL7 organization, and internationally through the International Standards Organization.

Because much of the needed information is only found in clinical text, several authors have suggested text-extraction or information extraction methods. Text based solutions would require the incorporation of Natural Language Processing into the solution set. Elkin and colleagues (141) recommend linking together clinical data from standard ontologies to "provide context to the facts by model, patient, document, section, subsection, problem, sentence, phrase, compositional expression, and concept level detail" (p 23).

Implications for Information Transfer Documents

Cross-sector transfer forms can serve as an information-transfer organizing model with information elements that can be organized by key care management (bowel/bladder, risk, pain, end-of-life, function restoration, medical management, behavioral) processes. The LINC transfer form is but one of many attempts to meet the information needs of clinicians involved in care transition (142-144). There are several limitations to using LINC (or others like it) as a recommended data set. These limitations include estimated costs for manual implementation, lack of standardized information content, and lack of mappings to a truly interoperability solution. One local system in Utah (Intermountain Healthcare) is testing the use of the LINC form by identifying key information elements within their system and organizing the information into a text based faxed document (see Appendix D). This is a temporary information communication solution but is not an information interoperable solution.

Individual care management processes can further be defined by the use of a Detailed Clinical Model (DCM) (86). In the case of the LINC form, local consensus has been reached and can be tested regionally and nationally for consensus, validation, and feasibility. Once a consensus information model has been vetted, semantic mappings can be conducted for interoperability. An interoperable solution can then be tested for usability and impact on outcomes. Usability and display will need to be defined across sectors and disciplines. Such a national effort has not been reported in the literature.

Contributions to Social Work, Health Services Research and Biomedical Informatics

Information transfer across the continuum of care on behalf of seniors is a challenging and complicated task. Findings from this research contribute to the research literature in a number of ways. Past research efforts have focused on specific disciplinary solutions such as medication reconciliation, discharge summaries and most recently nursing discharge summaries. Such an isolated approach is not sufficient and requires a broader approach in advocating on behalf of the patient. Social work as a discipline is trained in both patient advocacy and boundary spanning, thus bringing a comprehensive perspective to the problem. Embracing the need to facilitate cross-sector and interdisciplinary perspectives on behalf of seniors extends the value of the social work role as it relates to this problem.

Secondly, results from Study 2, although limited due to sample size, failed to find a significant bias against those patients with mental diseases with the

information transfer process. This research also reinforced the positive role for discharge summaries in the transfer process. The most important finding was the substantial degree of inconsistency and variability of document transfer.

Third, the low rates of transfer of nursing and social work documents were notable and contributed to the absence of key management and functional information at the concept information. The lack of such information validates the perceptions of the qualitative interviews. Establishing a standard set of clinical documents transferred on behalf of continuity of care (similar to existing requirements for medical orders and history and physicals) would greatly improve information transfer.

Fourth, an information solution which embraces a holistic perspective is necessary for working across disciplinary and organizational boundaries (100). Informatics is the bridging of clinical expertise with information technology solutions. A social work informaticist could facilitate: 1) explicit descriptions of the "joint cognitive system"; 2) boundary spanning across sectors and disciplines to bring integrated input into the solution; 3) definition of the information elements needed to develop an interoperable solution; and 4) provision of support to the testing and utilization of the informatic solution. Such an approach could build consensus on interdisciplinary clinical content standards which are more granular and extensible while bridging domain biomedical expertise into a care management framework.

Findings from this research address the heart of informatics as healthcare travels down the road of meaningful use. Interoperability between sectors and

systems is in its infancy. The LINC form which appears to be a solution to information transfer across the continuum does not meet interoperability standards. It does address the need for information transfer and communication as a first state and starts the dialogue towards more permanent solutions.

Limitations

There are several limitations associated with this work. The first limitation is the regionalized nature of the studies to the intermountain west region. Second, sample sizes in the retrospective chart reviews were small thus limiting the power of the study and statistical power. Third, even though the chart review was conducted twice, there was only one reviewer. The review process and data collection instruments were reviewed by the committee. The overall research goal for the three studies was to understand the phenomenon of information transfer across the continuum of care in anticipation of a larger study and to lay the groundwork for identifying appropriate solutions.

The underlying assumption in information transfer is that with good information transfer, patient care can be improved. What is not clear is what information, in what form and for what purpose. Research needs to be done especially as it relates to negotiating the chasms between sectors, corresponding information paradigms and varying terminology standards or lack thereof. Once an agreement has been reached on what the critical information elements are and how they are to be used, informatic solutions must then address the challenges associated with differing terminology standards in order to achieve seamless interoperability.

APPENDIX A

GLOSSARY OF ABBREVIATIONS

ADE	Adverse Drug Events
ADL	Activities of Daily Living
AE	Adverse Events
AHCG	Avalon Healthcare Group
AHRQ	Agency for Healthcare Research and Quality
ALF	Assisted Living Facility
ANOVA	Analysis of Variance
ASTM	American Society for Testing and Materials
ASWB	Association of Social Work Boards
CCHIT	Certification Commission of Health Information Technology
CCD	Continuing Care Document
CCR	Continuing Care Record
CDA	Clinical Document Architecture
CDC	Center for Disease Control
CERNER	CERNER – brand name
CIS	Clinical Information Systems
CMS	Centers for Medicaid and Medicare Services
CPAP	Continuous Positive Airway Pressure

DCM	Detailed Clinical Models
DNI	Do Not Intubate
DNR	Do Not Resuscitate
DPOA	Durable Power of Attorney
EACH	EHR Alternative Certification for Hospitals
EHR	Electronic Health Record
ER	Emergency Room
Excel	Microsoft Excel software
H&P	History and Physical
HIPAA	Health Information Privacy and Accountability Act
HIT	Health Information Technology
HMO	Health Maintenance Organization
IADL	Independent Activities of Daily Living
ICD-9-CM	International Classification of Diseases, Clinical Modification
ICF	International Classification of Functioning
ICF/MR	Intermediate Care Facility/Mental Retardation
IOM	Institute of Medicine
IRB	Institutional Review Board
IV	Intravenous
JCS	Joint Cognitive Systems
LINC	Linking Information Necessary for Care
LOINC	Logical Observation Identifiers Names and Codes
LTCH	Long Term Care Hospital

MDS	Minimum Data Set
NANDA	North American Nursing Diagnosis Association
NASW	National Association of Social Workers
NLP	National Language Processing
OASIS	Outcomes and Assessment Information Set
OBRA-87	Omnibus Budget Reconciliation Act of 1987
OT	Occupational Therapy
PCMH	Patient-Centered Medical Home
POA	Power of Attorney
PT	Physical Therapy
RAI	Resident Assessment Instrument
RAP	Resident Assessment Protocols
RCF	Rehabilitation Care Facility
RT	Respiratory Therapy
SBAR	Situation, Background, Assessment and Recommendation
SNOMED-CT	Systematized Nomenclature of Medicine – Clinical Terms
ST	Speech Therapy
SWI	Social Work Informatics
TJC	the Joint Commission
UMLS	Unified Medical Language System (UMLS)
USB	Universal Service Bus

UUMC	University of Utah Medical Center
VAMC	Veterans Administration Medical Center

APPENDIX B

DISCHARGE PLANNING INTERVIEW INSTRUMENT

I. Demographic Information

_____	_____
Name of Respondent	Date of Interview
_____	_____
Email contact information	Phone contact information
_____	_____
Discipline	Length of time doing discharge planning
_____	
Training/experience in discharge planning	

Please identify any tools and resources used to determine discharge readiness, placement need, discharge outcomes, and activities for those 65 and older.

Discharge readiness -

Placement need -

Discharge outcomes -

Discharge activities –

II. Interview Questions

1) Please describe how you are initially notified that a patient 65 and older needs discharge planning. Who contacts you? What do you do first? What follows then? Who do you speak to? What type of notes do you make? Where? How often?

2) Please describe the factors you take into consideration when making the decision for discharge planning for those 65 and older.

3) How soon are you usually notified that a patient needs discharge planning?
   a. Upon admission
   b. Within 24 hours of admission

c. Within 48 hours of admission
d. Variable, it depends
e. Other (Please explain)

4) Is a physician order needed for you to make contact with a patient 65 and older for discharge planning? If not, please explain how you are notified?

5) If an order is needed, how is it given?
   a. Verbally
   b. Hand written
   c. Standard order set
   d. Automated order set based on alert criteria
   e. Other (please explain)

6) What type of barriers have you encountered that slow the process of notification down regarding discharge planning for those 65 and older?

7) Please describe what type of information and how you secure additional information regarding your patient that contributes to the decisions for discharge planning.

8) What information is difficult for you to get in order to conduct a complete discharge planning assessment of those 65 and older? What is the source of this information? What are the barriers that you encounter?

9) How does the difficulty of obtaining certain information impact the timing of discharge placement of those 65 and older? How often does this happen? What happens if you cannot get certain information for discharge placement? What helps this process?

10) How are discharge outcomes incorporated in your decision making for discharge planning? What type of follow-up is conducted for those 65 and older to determine these outcomes?

11) Can you think of anything else that would help me understand the challenges you face related to discharge readiness, placement need, discharge outcomes or discharge activities for those 65 and older?

APPENDIX C

LINKING INFORMATION NECESSARY FOR CARE (LINC) FORM

L.I.N.C *Linking Information Necessary for Care*

Date: ____/____/____

TRANSITIONING **TO**: ❑ Hospital; ❑ SNF; ❑ ICF; ❑ ICF/MR; ❑ Swing Bed; ❑ RCF/ALF; ❑ LTCH; ❑ _____

FROM: ❑ Hospital; ❑ SNF; ❑ ICF; ❑ ICF/MR; ❑ Swing Bed; ❑ RCF/ALF; ❑ LTCH; ❑ _____

Name: *(Last)* _____ *(First)* _____ *(MI)* _____ *(DOB)* _____ MRN: _____

Transferring Facility: _____ Transferred to: _____ Date: ___/___/___; Time: ___:__

Contact/Title: _____; Unit Phone: _____ Fax: _____

Reason for Transfer: ❑ Cardiac; ❑ Respiratory; ❑ GI; ❑ Psy; ❑ Fall/Fx; ❑ LOC Status Change; ❑ Other: _____

Current Vitals: BP_____; T_____; P_____; R_____; Pulse Ox_____; Time____:_____; Weight _____ lbs.; Height ___ ft. ____ inches.

Allergies: ❑ No Known; ❑ Yes. *If "Yes" List All:* _____

Transported by: ❑ EMS; ❑ Family; ❑ Care Facility; Verbal Report Given by: (print name/title) _____

Name of Healthcare Decision Maker and/or Local Contact to be Notified: _____, Phone: _____

Advance Directives: ❑ Yes; ❑ No. *If "Yes" Indicate Type:* ❑ *Living Will;* ❑ *Power of Attorney;* ❑ *Special Power of Attorney; Sent with Person* ❑ *Yes;* ❑ *No,*

Able to Communicate: ❑ Yes; ❑ No. *If "No" Explain:* _____

Speaks English: ❑ Yes; ❑ No. *If "No" Specify Native Language:* _____

Religious/Cultural/Literacy/Other Issues: ❑ Yes; ❑ No. *If "Yes" Please Identify:* _____

Admission to Other Hospital/LTC Facility in Past 30 Days: ❑ None; ❑ Unknown; ❑ Yes. *If "Yes" List: Reason, Date & Location of Previous Admission:* _____

Skin Intact: ❑ Yes; ❑ No. *If "No" Identify each non-intact area and drain with a number and describe site and care below:*

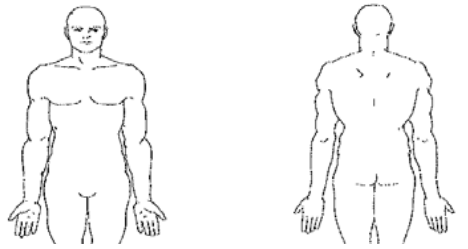
#1 Site: _____

Care: _____

_____

#2 Site: _____

Care: _____



Name: _____ (*continued from page 1*)

Most Recent Immunizations: ❑ *None;* ❑ *Influenza* ___/___/___; ❑ *Pneumonia* ___/___/___; ❑ *Tetanus* ___/___/___; ❑ *TB Skin Test* ___/___/___

Impairments: ❑ *None;*

- ❑ *Mental:* _____; ❑ *Speech:* _____;
- ❑ *Hearing:* _____ *Hearing Aid Sent with Person* ❑ *Yes;* ❑ *No;*
- ❑ *Vision:* _____ *Glasses Sent with Person* ❑ *Yes;* ❑ *No;*
- ❑ *Sensation:* _____
- ❑ *Amputation:* ❑ *Yes;* ❑ *No.* *If "Yes" Does Person Have Prosthesis* ❑ *Yes;* ❑ *No.* *If "Yes" was Prosthesis Sent with Person* ❑ *Yes;* ❑ *No.*
- ❑ *Contracture:* _____
- ❑ *Paralysis:* _____

Treatments Received Within Last 14 Days: - Date Administered:

	❑ *Chemotherapy*	___/___/___
	❑ *Radiation*	___/___/___
*	❑ *Oxygen Therapy*	___/___/___
*	❑ *Tracheotomy Care*	___/___/___
*	❑ Ventilator	___/___/___
	❑ *Transfusion(s)*	___/___/___
*	❑ *Dialysis*	___/___/___
	❑ *Isolation / Infection*	___/___/___
*	❑ *BiPap/CPAP*	___/___/___
	❑ *Hospice Care*	___/___/___
*	❑ *Suctioning; Type_____; Frequency_____*	___/___/___
	❑ *None of the Above Treatments or Procedures Received*	

* *Only complete for persons transferring to Skilled Nursing level of care. If dates are not recorded, the last 14 days of nurse notes and MARS must be sent to SNF.*

Activities of Daily Living:

	Independent	Needs Help	Not Able
Walking	❑	❑	❑
Toileting	❑	❑	❑
Turning	❑	❑	❑
Bathing	❑	❑	❑
Dressing	❑	❑	❑
Eating	❑	❑	❑
Transferring	❑	❑	❑

Treatment:

- *Physical Therapy* ❑ *Frequency_____; Last Received:* ___/___/___
- *Occup Therapy* ❑ *Frequency_____; Last Received:* ___/___/___
- *Speech Therapy* ❑ *Frequency_____; Last Received:* ___/___/___

The following items are REQUIRED to be sent with ALL patients on Day of Discharge:

✓	Face Sheet:	*With payer sources*	❑ *Yes;* ❑ No
✓	Medication Admin Record:	*Send most current and complete MAR which includes IV, IM and PO medications and flushes, blood transfusions and chemotherapy. If person is transferring to SNF care and treatment dates are not recorded in the above section, send last 14 days of MAR.*	❑ *Yes;* ❑ No
✓	H & P:	*If older than 30 days, have physician review/update/sign/date* (*for LTC use only)*	❑ *Yes;* ❑ No

_____

#3 Site: _____

Care: _____

Other uncontained body fluids/drainage _____

CHECK ALL THAT APPLY:

Mental Status: ❑ *Alert;* ❑ *Oriented;* ❑ *Non-Verbal;* ❑ *Unresponsive;* ❑ *Confused;* ❑ *Disruptive;* ❑ *Withdrawn;* ❑ *Depressed;* ❑ *Uncooperative;*

Pain Assessment: ❑ *None;* ❑ *Acute;* ❑ *Chronic;* ❑ *Intermittent;* ❑ *Sharp;* ❑ *Dull;* ❑ *Location:* _____;

❑ *Intensity (1-10)* _____*: Time of Last Pain Med:* ____:_____

Infection: ❑ *No;* ❑ *Yes. If "Yes" Colonization (Carrier)* ❑ *No;* ❑ *Yes. If marked "Yes" to either* ***Attach Appropriate Infection Form.***

Fall History: ❑ *No;* ❑ *Yes; If "Yes" Date:* ___/___/___*. Did Fall Result in Injury:* ❑ *Yes;* ❑ *No. If "Yes" Describe:*_____

Bowel: ❑ *Continent, Last BM* ____/____/___*;* ❑ *Involuntary;* ❑ *Diarrhea;* ❑ *Ostomy- Type:* _____*, Changed* ___/___/___

Bladder: ❑ *Continent;* ❑ *Incontinent;* ❑ *Catheter/Urostomy/Type*_____*, Inserted* ___/___/___*; Dsg Changed* ___/___/___

IV: ❑ *Type/location* _____*;* ❑ *IV Therapy: Medication-*_____*; Frequency*_____*; Last Dose Given*__/__/__*; Next Dose Due* __/__/__

Assisted Devices: ❑ *None;* ❑ *Cane;* ❑ *Walker;* ❑ *Wheelchair;* ❑ *Crutches;* ❑ *Other* _____*; Sent with Person* ❑ *Yes;* ❑ *No;*

Appetite/Nutrition: ❑*Diet/Type:*_____*;*❑*Good;* ❑ *Fair;* ❑ *Feeding Tube Type* _____*; Inserted/Changed* ___/___/___*; Dentures Sent:* ❑ *Yes;* ❑ *No;*

Safety Concerns: ❑ *None;* ❑ *Aspiration;* ❑ *Skin Breakdown;* ❑ *Seizures;* ❑ *Isolation;* ❑ *Wander/Elope;* ❑ *High Risk for Falls;* ❑ _____

Space intentionally left blank for facility identification

✓	Physician Orders / Discharge Summary:	*If not checked as "sent," Medical Records should send a copy to the receiving facility when completed.* ***Note to receiving facility:*** *If a Physician Discharge Summary is not received within 7 days, or to receive additional patient records, a request for information from the Medical Records department should be faxed to: _____ (fax number).*	❑ *Yes;* ❑ No
✓	Nursing Assessment/Notes:	*Send last 2 days if patient is transferring to SNF and treatment dates are not recorded in above section, send last 14 days of nursing notes.*	❑ *Yes;* ❑ No
✓	Consult Reports	*A copy of each consult*	❑ *Yes;* ❑ No
✓	PT/OT/ST/Wound Therapy:	*Evaluation & notes from the previous week*	❑ *Yes;* ❑ No
✓	Physician Progress Notes:	*Last 4 days*	❑ *Yes;* ❑ No
✓	Pertinent Laboratory Results:	*Include most recent UA, C&Ss, CBC, glucose, electrolytes, and labs used in dosing meds (ie. Theophylline, Dilantin levels, INFs, etc.)*	❑ *Yes;* ❑ No
✓	Discharge Medication Reconciliation Record		❑ *Yes;* ❑ No
✓	Adv. Directive-DPOA-Life w/ Dignity		❑ *Yes;* ❑ No
✓	This Completed Form		❑ *Yes;* ❑ No

Based upon post acute care facility's requirements, the following MAY need to be sent. Check with each facility PRIOR to discharge.

✓	Pertinent Radiology/Special Studies Reports:	*Include swallowing studies, MRIs, CT Scans, ultrasounds, EKG, stress test, echo, etc.*	❑ *Yes;* ❑ No
✓	Operative Reports:	*For all major surgeries*	❑ *Yes;* ❑ No
✓	Preadmission Screening & Annual Resident Review (PASARR):	*Complete screening for patients who are suspected of having mental illness (MI), developmental disabilities/mental retardation (DD/MR), and/or related conditions and who are going to a Medicaid-certified LTC facility*	❑ *Yes;* ❑ No

L.I.N.C. Form Completed By: _____ Date: _____

APPENDIX D

IHC TEST FAX

IMC , Case Management Dept.

**** CONFIDENTIAL NOTICE ****

NAME: XTEST, FAX #: 27200070 CASE MANAGEMENT CC REVIEW & HIST REPORT

CASE MNGMNT CC REVIEW & HIST REPORT

NAME: XTEST, FAX EMPI#: [redacted] AGE: 77 Y DOB: [redacted] SEX: F ROOM: [redacted]
ADMIT DATE: [redacted] ADMIT WT: 49.44 kg HT: 157.5 cm BSA: 1.56 sqm MOST RECENT WT: 56.2 kg ADMIT BMI: unknown
ADMIT DIAG: R FEMUR FX SS BRADEN: 13 BEE: 1100.37 kcal/day [redacted]
ALLERGIES: CODEINE; Codeine

Primary Insurance : [redacted]
Secondary Insurance: [redacted]
Tertiary Insurance [redacted]

Guarantor : Patient is guarantor

Last Admit: [redacted]
Last Disch: [redacted]

Emergency Admission : Y / N
Readmission with in 31 days: Y / N

Current Level of Care: Acute Care _____ Telemetry Unit _____ Coronary Care Unit _____ ICU _____

ADMITTING SIGNS AND SYMPTOMS

RELATED / PERTINENT MEDICAL HISTORY

SEVEN DAY SUMMARY OF
VITALS/MEASURES

	FRIDAY 12/11/09	SATURDAY 12/12/09	SUNDAY 12/13/09	MONDAY 12/14/09	TUESDAY 12/15/09	WEDNESDAY 12/16/09	THURSDAY 12/17/09
SYSTOLIC/DIASTOLIC ARTERIAL PRESSURE (mmHg):							
Average Pressure	123/ 68	122/ 67	131/ 69	120/ 51			
Average Variation from Average	11/ 11	6/ 10	10/ 11	5/ 6			
Maximum	138/ 95	137/ 94	158/116	129/ 63			
Minimum	99/ 52	109/ 48	106/ 53	113/ 47			
HEART RATE (beats/min):							
Average	82	79	80	80			
Average Variation from Average	11	7	8	3			

Maximum	111	88	92	85
Minimum	64	63	54	71
TEMPERATURE (degress C):				
Average	36.8	36.5	36.2	
Average Variation from Average	.2	.3	.3	
Maximum	37.2	37.0	36.8	
Minimum	36.5	36.0	35.4	
MEAN SYSTEMIC ARTERIAL PRESSURE (mmHg):				
Average Pressure	86	86	87	69
Average Variation from Average	11	7	10	5
Maximum	106	102	123	78
Minimum	68	68	68	64
BLOOD GLUCOSE:				
Average	112	93	116	
Average Variation from Average	9	8	17	
Maximum	120	105	142	
Minimum	103	84	97	

MEDICATIONS

... SCHEDULED MEDICATIONS ...

?O#	MEDICATION	DOSE	ROUTE	SCHEDULE	DUE	AMOUNT/24h	LAST GIVEN	ORDERED
L10.	MAGNESIUM SULFATE/WATER 4%, IV SOLN	2 GM	IVPB	AS DIRECTED				12/13.21:51
L11.	SODIUM PHOSPHATE/NACL 0.9%, IV SOLN	15 MMOL	IVD	Q 2 hrs	12/13.22:00			12/13.21:51
L12.	POTASSIUM PHOSPHATE/NACL 0.9%, IV S	15 MMOL	IVD	Q 2 hrs	12/13.22:00			12/13.21:51
L13.	SOD BIPHOS/POT PHOS (PHOS-NAK,NEUTR	2-6 EA	NG	AS DIRECTED				12/13.21:51
L14.	POTASSIUM CHLORIDE/STERILE WATER, P	20 MEQ	IVD	Q 2 hrs	12/13.22:00			12/13.21:51
L15.	POTASSIUM CHLORIDE/STERILE WATER, P	40 MEQ	IVD	Q 4 hrs	12/14.07:59		12/14.03:59	12/13.21:51
L16.	POTASSIUM CHLORIDE (KLOR-CON), PACK	10-120 MEQ	NG	AS DIRECTED				12/13.21:51
L17.	NS W/KCL 40MEQ/500ML [PHARMACY PREP	500 ML	IVD	Q 4 hrs	12/13.22:00			12/13.21:51
L09.	SODIUM CHLORIDE 0.9%, IV SOLN.	1000 ML	IVD	Q 20 hrs	12/14.07:34		12/13.21:34	12/13.20:55

... PRN MEDICATIONS ...

?O#	MEDICATION	DOSE	ROUTE	SCHEDULE	DUE	AMOUNT/24h	LAST GIVEN	ORDERED

119. ACETAMINOPHEN (TYLENOL), TABLET	325-650 MG	PO	PRN Q 4 hrs			12/13.21:52
121. MorpHINE, SYRINGE	1-3 MG	IV	PRN Q 2 hrs		12/14.05:31	12/13.21:53
2. SODIUM CHLORIDE 0.9% (SALINE FLUSH)	1-4 EA	IV	PRN ,PRN			12/05.14:35
120. ONDANSETRON (ZOFRAN), VIAL	4-8 MG	IV	PRN Q 8 hrs		12/13.23:14	12/13.21:52

MEDICATION SUMMARY FOR EACH 24 HOURS

MEDICATIONS

			FRIDAY 12/11/09	SATURDAY 12/12/09	SUNDAY 12/13/09	MONDAY 12/14/09	TUESDAY 12/15/09	WEDNESDAY 12/16/09	THURSDAY 12/17/09
FUROSEMIDE (LaSIX), VIAL	MG	IV	60	20	40				
DiphenhydrAMINE (BENADRYL), VI	MG	IV	25						
QUETIAPINE FUMARATE (SeroQUEL)	MG	PO	12.50						
SENNA/DOCUSATE SODIUM 8.6-50MG	EA	PO	2	4					
CALCIUM CARBONATE (TUMS), TABL	MG	PO	1500	1000					
LEVOFLOXACIN (LevaQUIN), TABLE	MG	PO	250	250					
METOPROLOL (LOPRESSOR), TABLET	MG	PO	25	12.50					
POTASSIUM CHLORIDE (KLOR-CON),	MEQ	PO	20						
CHOLECALCIFEROL(VITAMIN D-3),	UNITS	PO	1000	1000					
THERAPEUTIC VITAMIN W/MINERAL,	EA	PO	1	1					
WARFARIN (COUMadin), TABLET	MG	PO	3						
ALLOPURINOL (ZYLOPRIM), TABLET	MG	PO	300	300					
LEVOTHYROXINE (LEVOTHROID/SYNT	MG	PO	.09	.09	.09				
OMEPRAZOLE (PriloSEC), CAPSULE	MG	PO	20	20	20				
HEParin/NaCl 0.45%, IV SOLN.	UNITS	IVD	11502	11000	600				
NS W/KCL 40MEQ/500ML [PHARMACY	ML	IVPB		500	500				
ACETAMINOPHEN (TYLENOL), TABLE	MG	FEED		650					
POTASSIUM CHLORIDE (KCL), VIAL	MEQ	IVPB		40					
MAGNESIUM SULFATE 50% (AS GM),	GM	IVPB		4					
SODIUM CHLORIDE 0.9%, IV SOLN.	ML	IVPB		500	100				
HydroCODone/APAP 7.5/325 (NORC	EA	PO		2					
MorpHINE, SYRINGE	MG	IV			9				
ONDANSETRON (ZOFRAN), VIAL	MG	IV			4				
CEFAZOLIN (KEFZOL), ADD-VANTAG	MG	IVPB			1000				
SODIUM CHLORIDE 0.9%, IV SOLN.	ML	IVD			513				
POTASSIUM CHLORIDE/STERILE WAT	MEQ	IVD			15.40	23.44			

INTAKE/OUTPUT/WEIGHT/HEIGHT

BSA (SQM): 1.56	FRIDAY 12/11/09	SATURDAY 12/12/09	SUNDAY 12/13/09	MONDAY 12/14/09	TUESDAY 12/15/09	WEDNESDAY 12/16/09	THURSDAY 12/17/09
INTAKE (ml):							
Oral Input	100	800	200				
Non-Blood IV	122	1140	1161	59			
TOTAL	222	1940	1361	59			
OUTPUT (ml):							
Foley cath out	3550	1200	2489				
Insensible loss	714	658	574				
TOTAL	4264	1858	3063				
NET FLUID BALANCE (ml):	-4042	82	-1701				
WEIGHT NEAREST 6:00 (Kg):			56.20				
BASIL ENERGY EXPENDITURE (BEE):			1100				

TREATMENT PROVIDED / PROPOSED

PROCEDURES PROPOSED / PERFORMED

LAB

CBC & DIFFERENTIAL COUNT

DATE TIME	WBC K/uL	RBC M/uL	HGB g/dL	HCT %	MCV fL	MCH pg	MCHC g/dL	RDW %	PLTS K/uL	MPV fL	PLTMass fL/nL	NRBC /100WBC	META %	MYELO %	BAND %
14DEC 03:15	10.7H	2.41L	8.1L	23.6L	97.9	33.5	34.2	17.7H	185	6.0L		0			
13DEC 21:43	12.8H	2.63L	8.7L	25.7L	97.9	33.1	33.8	17.9H	273	6.2L		0			
13DEC 04:00	2.9L	2.47L	8.2L	23.8L	96.2	33.1	34.4	17.0H	98L	6.5L		0			
11DEC 12:45	9.2	3.02L	10.1L	28.9L	95.8	33.5	35.0	16.9H	145L	7.1		0			

DATE	TIME	SEG %	LYMPH %	MONO %	EOS %	BASO %	GRAN %	NEUT K/uL	LYMPH K/uL	MONO K/uL	EOS K/uL	BASO K/uL	GRAN K/uL	IGRAT Ratio
11DEC	12:45	86.1H	4.9L	7.9	.8	.3		7.9H	.5L	.7	.1	.0		

Platelet,Est: Agrees with count
Differential Type Performed: Auto-Diff

COAGULATION STUDIES

DATE	TIME	PT sec	INR	PTT sec	TT sec	FIB mg/dL	DDMR mcg/mL	DD QNT ng/mL FEU	DD QUAL	FSP mcg/mL	IVY BT min	ACTC sec	ACTK sec
14DEC	03:15	17.1 H	1.4	33									
		PTT	Average heparin response (0.3-0.7 U/mL anti-Xa): 60-100s										
		INR	Typical warfarin therapeutic ranges: Moderate 2.0-3.0, High 2.5-3.5										
13DEC	21:43	16.7 H	1.4										
13DEC	12:55	17.5 H	1.4										
13DEC	04:00	18.3 H	1.5										
13DEC	01:30			73 H									
12DEC	22:35	17.6 H	1.5										
12DEC	17:15			48 H									
12DEC	10:29			47 H									
12DEC	04:00	19.1 H	1.6	69 H									
11DEC	22:15			44 H									
11DEC	14:45			40 H									

CHEMISTRY I - LYTES, RENAL

DATE	TIME	Na mmol/L	K mmol/L	Cl mmol/L	CO2 mmol/L	ANGAP mmol/L	Gluc mg/dL	BUN mg/dL	Creat mg/dL	Osmol mOsm/kg	Ca mg/dL	ICa mmol/L	PC-ICa mmol/L	Mg mg/dL	PO4 mg/dL
14DEC	03:15	134L	4.1	98	29	7.0	110H	18	.72		7.8L				
13DEC	21:43													1.9	3.9
13DEC	21:43	134L	3.7	95L	30	9.0	142H	15	.73		8.0L				
13DEC	21:40						166H								
13DEC	12:55	134L	3.8	94L	32H	8.0	97	14	.68		8.1L				
13DEC	09:50		4.0												
13DEC	04:00	132L	3.4L	96L	31H	5.0	84	16	.70		7.4L				
12DEC	22:35	131L	2.9L	93L	30	8.0	89	15	.78		7.5L				
		K	Critical value notification and read back at:												
		K	2325 TO RHONDA,RN												
12DEC	08:16						105H								
11DEC	20:39						120H								
11DEC	12:45	128L	3.7	95L	27	6.0	103H	18	.70		7.9L				

Chemistry II - Hepatic Profile

DATE	TIME	TProt g/dL	Alb g/dL	TBil mg/dL	UBil mg/dL	CBil mg/dL	ALT IU/L	AST IU/L	LDH IU/L	Alk Phos IU/L	GGT IU/L
14DEC	03:15	5.8L	3.1L	1.2			34	60H		96	
11DEC	12:45	5.8L	2.8L	1.3			24	59H		93	

Cardiac Markers

DATE	TIME	CK Units/L	CKMB Units/L	MB % %
11DEC	12:45	198	6.4H	3

MB % Results consistent with acute myocardial damage
MB % (CKMB > 5 ng/mL and > 3% of total CK).

Troponin

DATE	TIME	Troponin ng/mL	POCT ng/mL	TropI-2ndG ng/mL
11DEC	12:45			.06

TropI-2ndG Gray zone. Myocardial ischemia possible. Retesting at least
TropI-2ndG six hours after onset of symptoms and/or additional
TropI-2ndG evaluation should be considered.

MAJOR CHEMISTRY PANEL

DATE	TIME	NA mmol/L	K mmol/L	CL mmol/L	CO2 mmol/L	ANGAP mmol/L	GLU mg/dL	BUN mg/dL	CREA mg/dL	CA mg/dL	TPRT g/dL	ALB g/dL	PHOS mg/dL	CHOL mg/dL	TRIG mg/dL
14DEC	03:15	134 L	4.1	98	29	7	110 H	18	.72	7.8 L	5.8 L	3.1 L			
13DEC	21:43												3.9		
13DEC	21:43	134 L	3.7	95 L	30	9	142 H	15	.73	8.0 L					
13DEC	12:55	134 L	3.8	94 L	32 H	8	97	14	.68	8.1 L					
13DEC	09:50		4.0												
13DEC	04:00	132 L	3.4 L	96 L	31 H	5	84	16	.70	7.4 L					
12DEC	22:35	131 L	2.9 L	93 L	30	8	89	15	.78	7.5 L					

K: [redacted]
K: Critical value notification and read back at:

11DEC 12:45	128 L	3.7	95 L	27	6	103 H	18	.70	7.9 L	5.8 L	2.8 L	

DATE TIME	URIC mg/dL	TBIL mg/dL	CBIL mg/dL	UBIL mg/dL	ALKP U/L	AST U/L	ALT U/L	LDH U/L	GGT U/L	MG mg/dL	AMY U/L	GFR Est by MDRD eq
14DEC 03:15		1.2			96	60 H	34					
13DEC 21:43										1.9		
11DEC 12:45		1.3			93	59 H	24					

Whole Blood Glucose

DATE TIME	Glucose mg/dL	Device Comment
13DEC 21:40	166H	
12DEC 08:16	105H	
11DEC 20:39	120H	

Device Notified RN

Bilirubin, Fractionated

DATE TIME	Bili-C mg/dL	Bili-U mg/dL	Bili-T mg/dL	Bili-N mg/dL	Urine Bili mg/dL
14DEC 03:15			1.2		
11DEC 12:45			1.3		

BLOOD BANK TESTS

Date Time	ABO/Rh	Rh Confirmation	Antibody Screen	Antibody ID	Antibody Titer
12DEC 14:55			Negative		
12DEC 14:55	B Positive				

Date	Time	Antigen Type	Direct Coombs-Poly	Direct Coombs-IgG	Direct Coombs-Compl

BLOOD BANK PRODUCTS

DATE	TIME	COMPONENT	ABORH	UNIT NUMBER	INTERP	STATUS	AGTYPE
13DEC	08:33	Plasma, Th	B Posi	20LH40528		Transfused	
13DEC	08:33	Plasma, Th	B Posi	20LL40507		Transfused	
13DEC	08:33	Plasma, Th	B Posi	20LL41057		Transfused	
13DEC	08:33	Plasma, Th	B Posi	20LL40499		Transfused	
12DEC	14:55	LRBC	B Posi	20LY87511	Compatible	Crossmatched	
12DEC	14:55	LRBC	B Posi	20LW26176	Compatible	Crossmatched	
12DEC	14:42	Plasma, Th	B Posi	20LL40551		Transfused	
12DEC	14:42	Plasma, Th	B Posi	20LL41019		Transfused	
12DEC	14:42	Plasma, Th	B Posi	20FT24222		Transfused	
12DEC	14:42	Plasma, Th	B Posi	20Z53735		Transfused	

Alkaline Phosphatase Panel

DATE	TIME	Total Units/L	ALKST Units/L	ALKLA Units/L	ALKRA %
14DEC	03:15	96			
11DEC	12:45	93			

MICROBIOLOGY

Culture and sensitivity data not available for the specified date and time.

Microbiology Reports

Collected	Test	Status	Updated	Lab Accession #

RADIOLOGY PROCEDURES ORDERED

Date.Seq	Examination	Reason	Requesting Doctor	Dictating Radioligist	Transcribed

PERTINENT RADIOLOGY RESULTS

RESPIRATORY THERAPY CHARTING

MEDICATED AEROSOL CHARTING

	12/11/09 05:00
Interface	Mouthpiec
Pred PEF	374.16
Pre.PF%Pred	0
Pst PF%Pred	0
Pre HR	91
Post HR	96
Pre RR	20
Post RR	20
Source Gas	Oxygen
Teaching	Y
Position	Semi-Fowl
Condition 1	Alert
2	Fatigued
Objective	Bronchodi
Duration	20
Freq	One
Therapist	BRYANT

Drug Data:

12/11.05:00

Drug: .5ML (Albuterol Concentrate) DOSE: 2.50 Units: MG

Drug: IPRATROPIUM 0.2MG/ML (AtroVENT), SOLUTION DOSE: .50 Units: MG

MEDICATED AEROSOL CHARTING

Textual Data:

12/11 05:00 **PRE BREATH SOUNDS:Coarse, Rales, Bilateral;**
POST BREATH SOUNDS:Improved Aeration;
COUGH:Congested;

O2 THERAPY CHARTING

	12/14/09 00:26	12/13/09 20:42	12/12/09 23:29	12/11/09 10:43	12/10/09 11:45	12/09/09 14:25	12/08/09 15:56	12/07/09 11:02	12/06/09 16:52	12/05/09 20:03
nterface	Nasal Can	Nasal Can	Nasal Can	Nasal Can	Nasal Can	Nasal Can	Simple Ma	Simple Ma	Nasal Can	Nasal Can
re Flow LPM	2.000	6.000	1.000	2.000		1.000	2.000	9.000	3.000	2.000
pO2	98	95	96	98		95	99	98	95	97
pO2 RA				94	94					
osition	Supine	Supine			Semi-Fowl	Semi-Fowl				
ondition 1	Asleep	Calm			Confused	Confused				
2					Cooperati					
hg Per Prot	N	N	N	N	N	Y	N	N	N	N
bjective	Oxygenati	Oxygenati	Oxygenati	Oxygenati	Intermitt	Oxygenati	Oxygenati	Oxygenati	Oxygenati	Oxygenati
uration	5	5	5	5	5	5	5	5	5	5
herapist										

O2 THERAPY CHARTING

extual Data:

2/10 11:45 PRE BREATH SOUNDS:Moderately Decreased, Bilateral;
2/09 14:25 POST BREATH SOUNDS:Slightly Decreased, Clear, Bilateral;
2/05 20:03 COMMENTS:per rn

BLOOD GASES

No Blood Gas data available for this shift

CONSULTS ORDERED

SURGERY(IES)

DISCHARGE PLAN / NEEDS

Hospital Case Manager and Phone number: (if needed)

OTHER ISSUES AND COMMENTS

Reviewer's initials:_____

INTERMOUNTAIN MEDICAL CENTER History and Physical Report

Date of Service:
HISTORY OF PRESENT ILLNESS: I was called by emergency room staff and asked to see with regard to a fracture of her right hip. She is 77-year-old, ground level fall today at home, pain in the right shoulder and right hip, severe enough that it required a trip to the emergency room. Her daughter accompanies her and gives all the history as Ms. Park was very somnolent.

REVIEW OF SYSTEMS: She had some recent falls, which prompted an emergency room evaluation on November 20, 2009. She has had a urinary infection. She has some element of recent memory loss and confusion.

PAST MEDICAL HISTORY: Includes high blood pressure, gout, hypothyroid.

PAST SURGICAL HISTORY: Open heart surgery with valve replacement, and hysterectomy.

MEDICATIONS: Levothyroxine 88 mcg daily, allopurinol 300 mg daily, Coumadin 2.5 mg daily for the heart valves, benazepril recently started 10 mg daily.

ALLERGIES: The daughter indicates she has allergies to most pain medications and certainly to codeine.

SOCIAL HISTORY: Nonsmoker. Lives with her husband.

PHYSICAL EXAMINATION:
VITAL SIGNS: Blood pressure 110/66, heart rate 89, respiratory rate 16, temperature 36.9, and 3 L sat 99%.
GENERAL: As I mentioned above, was very somnolent, did not respond to voice, did not respond really to touching, though I did not move her injured extremities.
MUSCULOSKELETAL: She has swelling around the right shoulder, which is noticeable and different than the left. She keeps her right arm with the elbow in a flexed position and then across her chest. Radial pulse is palpable. Overall alignment otherwise looks good and I do not see any swelling in the region of the forearm or wrist. Left upper extremity, movement of the shoulder, elbow, and wrist produces no

pain, alignment normal, no evidence of swelling or external sign of injury. Radial pulse is present, has a ring on her ring finger. Right lower extremity in some slight abduction and marked outward rotation. Pedal pulse is palpable, no open wounds noted on the leg, but she has some little blood spots on the sheet. Hip skin is intact. Left lower extremity, gentle movement, nonpainful, alignment normal. Skin around both lower legs is brownish discolored. Pedal pulse on the left is just palpable. As I mentioned above, no spontaneous movement of the extremities.

LABORATORY DATA: Hematocrit 34, white count 7, INR 3.8, creatinine 0.66, potassium 4.1, sodium 132.

RADIOLOGICAL DATA: X-rays of right shoulder, AP and scapular Y demonstrate a fracture through the neck and greater tuberosity without major displacement. No other fractures seen around the shoulder.

AP of the pelvis and a frog view and a groin view of the right hip demonstrate a fracture of the femoral neck with complete displacement.

ASSESSMENT: Right humeral neck fracture. This appears on the x-rays available to be fairly normally aligned and could be treated nonoperatively. However, I would expect some permanent loss of motion and it may end up displacing as time goes on. Fracture of the right femoral neck. [redacted] age of 77, given what her daughter describes to me as being somewhat poor health and forgetfulness, I do not think she is an optimal candidate for internal fixation. I think her best option would be for a replacement. This would give her the ability to more reliably be able to walk. However, it is much bigger surgery than our attempt at reduction and pinning. In any event, no surgery is possible at the present time given her hyperanticoagulation.

PLAN: I met with the patient's daughter and presented paper copies of the injuries, as they have so far been identified. I suggested that at least for now, the shoulder can be treated nonoperatively. I suggested that as far as the hip goes, a surgical treatment would be the best option and for reasons mentioned above, I think a replacement might be her best choice. I have indicated to her that I do not do those type of procedures, but will have a colleague come and visit with them. Given her hyperanticoagulation, it may be that her INR will not be safe enough in order to proceed before a couple of days go by. We will give her vitamin K right now. We will probably need to repeat it. As with the chronicity of anticoagulation, I expect it may take quite an effort to get the INR down. I have indicated to the patient's daughter that there is a mortality rate of 1 year that might approach 30% after the hip fracture, and I told her that I thought it depend a lot on the patient's motivation to get better. We have reviewed risks of infection, bleeding, and nerve injury. I have also contacted the hospitalist to see her for a preop evaluation. I have told her it may be hard to find something that will provide her comfort without making her sick. All questions answered and done.

[redacted]

RFH/ps VID: [redacted] TID: 2637576 D: [redacted] T: [redacted]

PHYSICIAN [redacted]

NAME: XTEST, FAX #: [redacted] CASE MANAGEMENT CC REVIEW & HIST REPORT

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